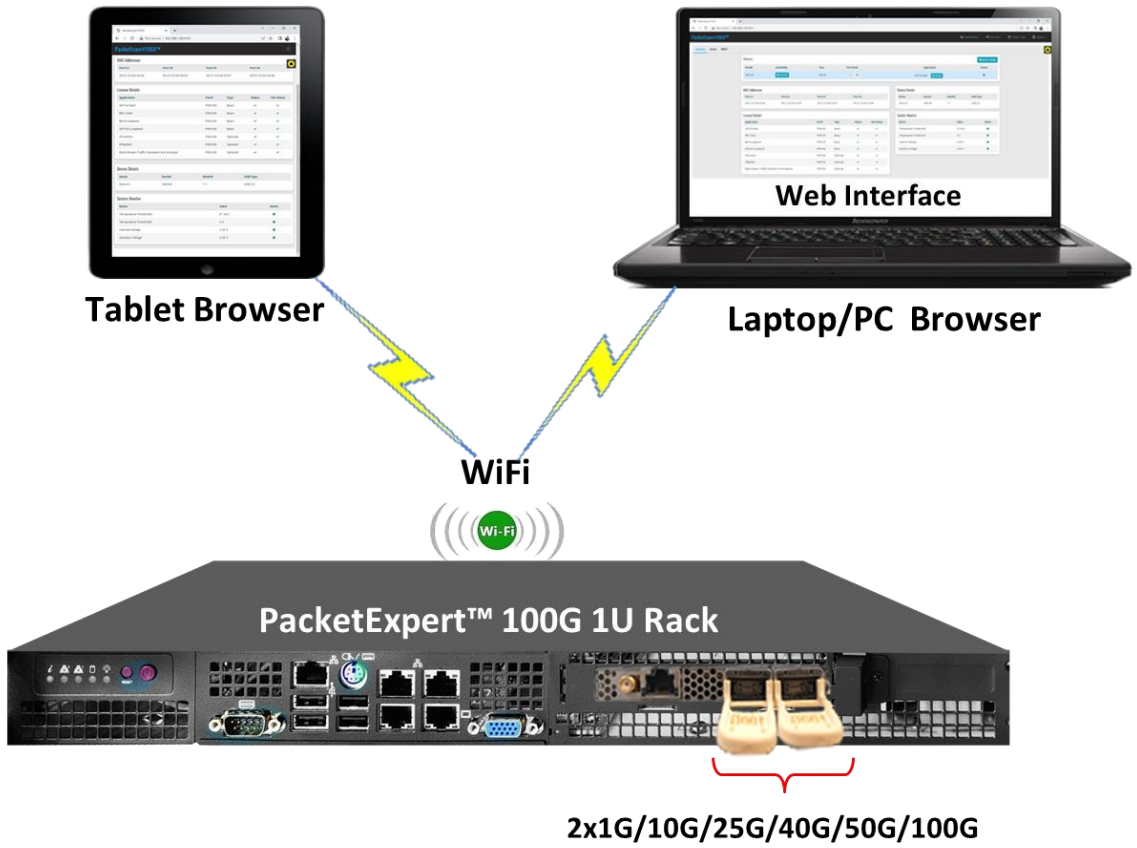
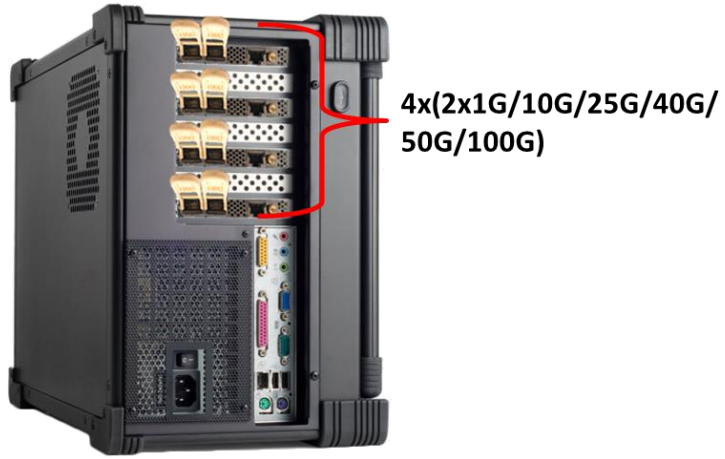
# PacketExpert™ 100G- Comprehensive Ethernet/IP Test Solution

## 1G, 10G, 25G, 40G, 50G and 100Gbps

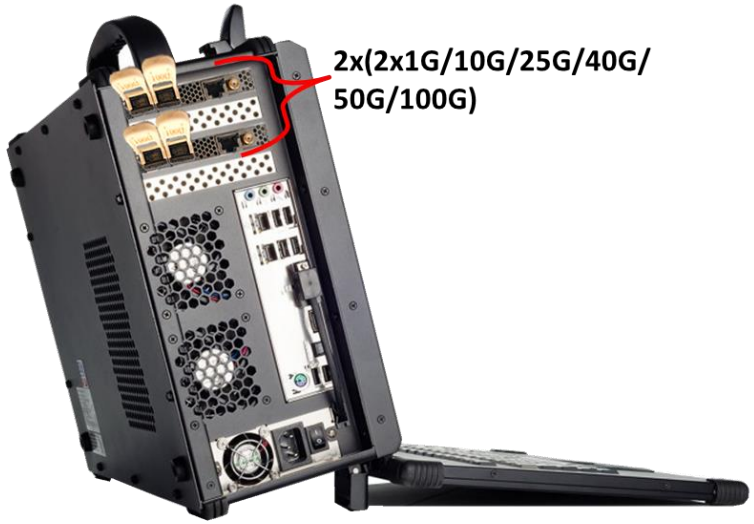
GL Communications Inc.
818 West Diamond Avenue - Third Floor, Gaithersburg, MD 20878
Phone: (301) 670-4784 Fax: (301) 670-9187 Email: info@gl.com
Website: https://www.gl.com

# PacketExpert™ 100G




Portable PacketExpert™ 100G
(Lunchbox)



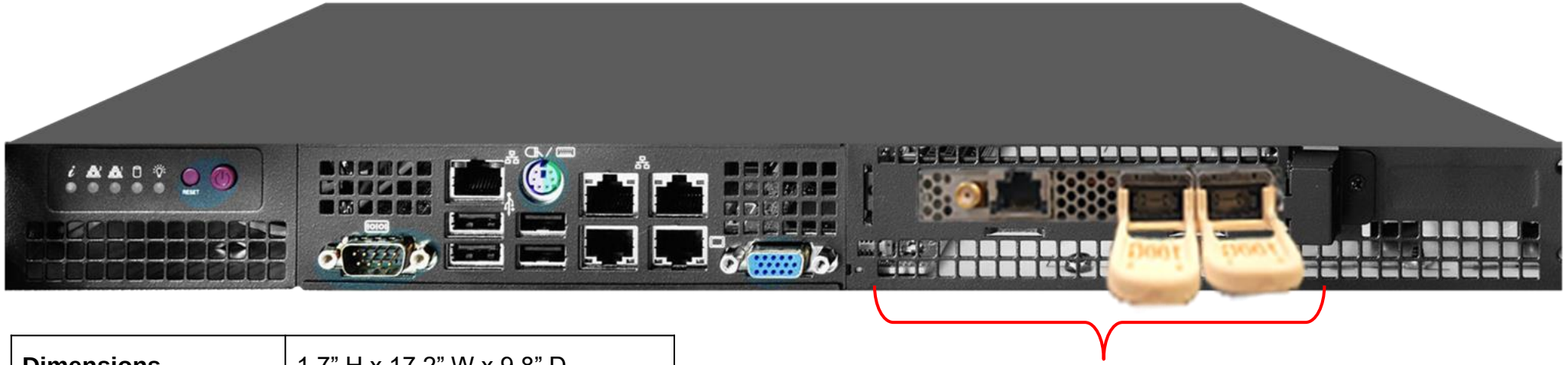

Portable PacketExpert™ 100G
(Lunchbox)

GL Communications

# Main Features

- Portable PCIe based hardware supports 2*100G ports
- High density options allow 4*100G and 6*100G ports
- Supports QSFP28 form factor
- Supports 1G, 10G, 25G, 40G and 50G speeds on the same ports using QSFP adapters with respective SFP modules
- Includes web-based interface, accessible through all standard web browsers across different operating systems
- The web interface allows multiple users to connect to a single web server and independently run tests on different hardware units
- Control multiple devices from a single GUI, multiplying the number of ports available per system
- Simultaneously generate and receive Ethernet traffic at 100% wire-speed (bidirectional 100 Gbps rate)
- User-configurable frame size and rate
- Wire speed BERT, Smart Loopback and RFC 2544 applications
- Support for frame lengths from 64 bytes to Jumbo frames (up to 2048 bytes)
- Test at Ethernet (Layer 2), VLAN / Stacked MPLS (Layer 2.5), IP (Layer 3 including IPv4 and IPv6) and UDP (Layer 4)
- Customize Ethernet, IP and UDP protocol headers

# PacketExpert™ 100G – 1U Rack PC



**2x1G/10G/25G/40G/50G/100G**

| | |
|---|---|
| **Dimensions** | 1.7” H x 17.2” W x 9.8” D |
| **Weight** | 10 lbs |
| **Expansion slots** | 1x Full-height |
| **Power supply** | 200W |

GL Communications

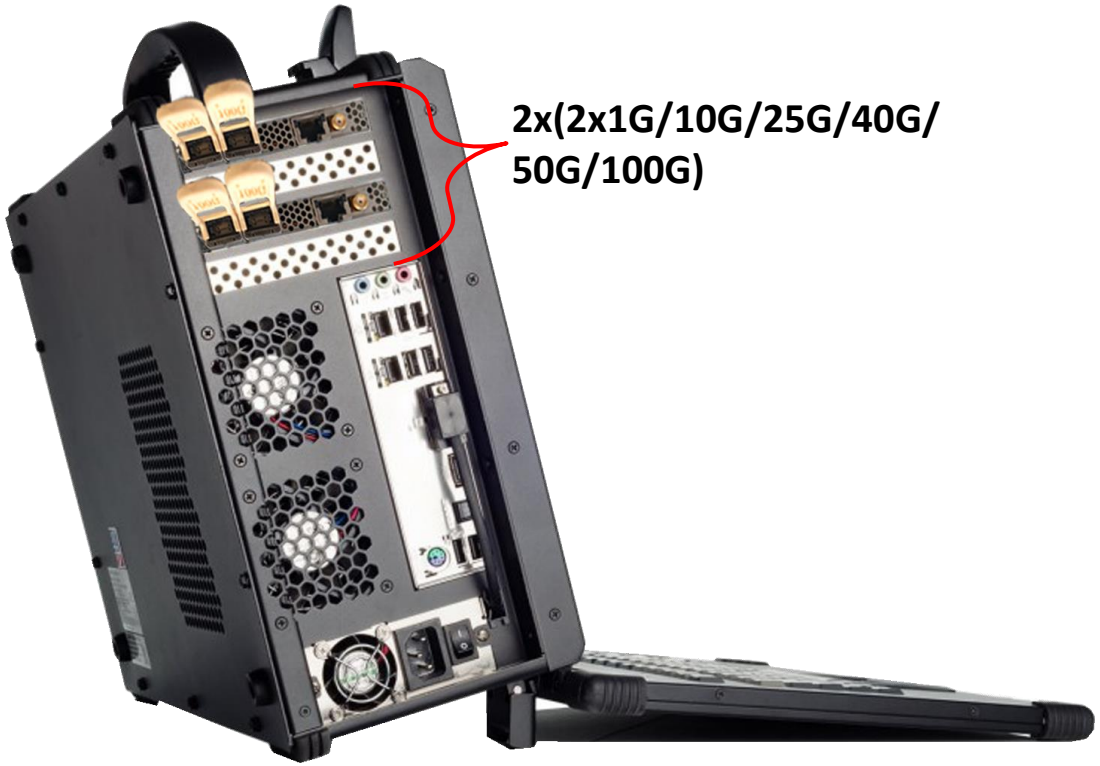
# PacketExpert™ 100G Portable Platforms (Lunchbox)

**Ultra-Portable PacketExpert™ 100G (Lunchbox)**

| | |
|---|---|
| **Dimensions** | 12.4” H x 16.41” W x 4.39” D |
| **Weight** | 16.5 lbs |
| **Expansion slots** | Up to 2 |
| **Power supply** | 400W (optional 500W) |
| **Display** | 17.3” 1920x1080 |

GL Communications

# PacketExpert™ 100G Portable Platforms (Lunchbox)



**Portable PacketExpert™ 100G (Lunchbox)**

| | |
|---|---|
| **Dimensions** | 13.62” H x 16.50” W x 7.25” D |
| **Weight** | ~23 LBS (10.4KG) |
| **Expansion slots** | Up to 4 |
| **Power supply** | 680W 100/240VAC |
| **Display** | 17.3” 1920x1080 |

GL Communications

# PacketExpert™ 100G Portable Platforms (Lunchbox)

4x(2x1G/10G/25G/40G/
50G/100G)

**Portable PacketExpert™ 100G (Lunchbox)**

| | |
|---|---|
| **Dimensions** | 17.06” x 13.67” x 9.02” (H x W x D) |
| **Weight** | ~30 LBS |
| **Expansion slots** | Up to 7 |
| **Power supply** | 1000W 100-240V 50-60 Hz 80PLUS |
| **Display** | 17.3” 1920x1080 |

GL Communications

# PacketExpert™ 100G – 4U Rack PC

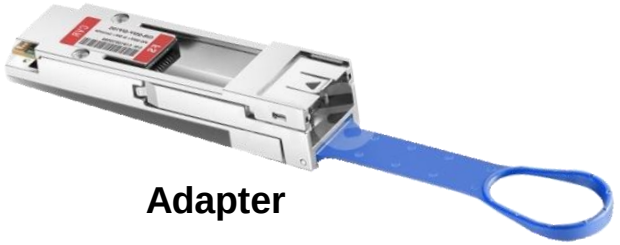
**4x(2x1G/10G/25G/40G/50G/100G)**

| | |
|---|---|
| **Dimensions** | 6.9” H x 16.9” W x 17.5” D |
| **Weight** | 35 lbs. |
| **Expansion slots** | 7 |
| **Power supply** | 1300W |

GL Communications

# Optical Connectors and SFP Transceivers

100G QSFP28 Optical Transceiver



Adapter

SFP28 Optical Transceiver

40G QSFP+ Transceiver

SFP+ Optical Transceiver

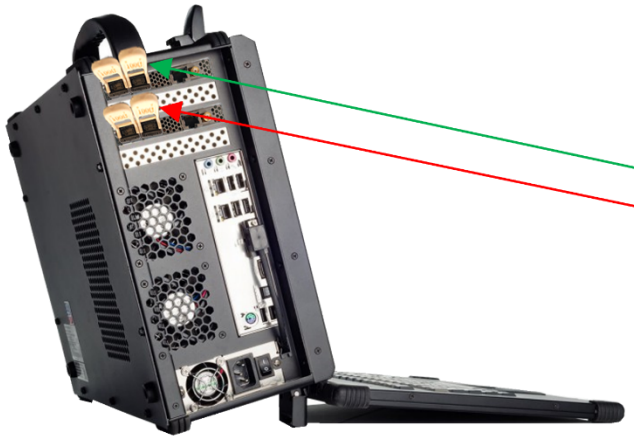
LC Connector

MTP/MPO Connector

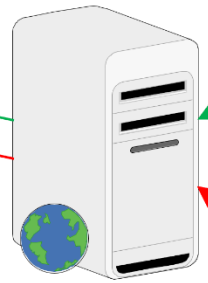
- Many More Optical Connectors and SFP Transceivers can be used

GL Communications

# PacketExpert™ 100G Architecture

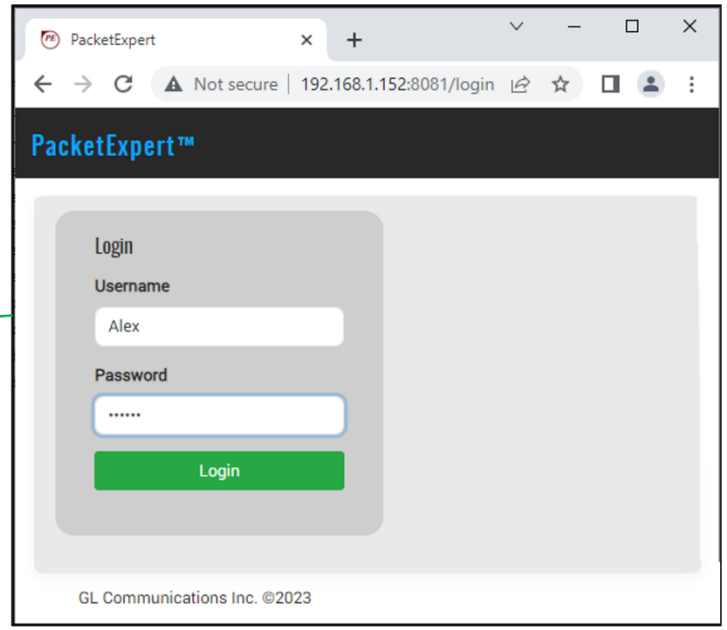


PacketExpert™ 100G

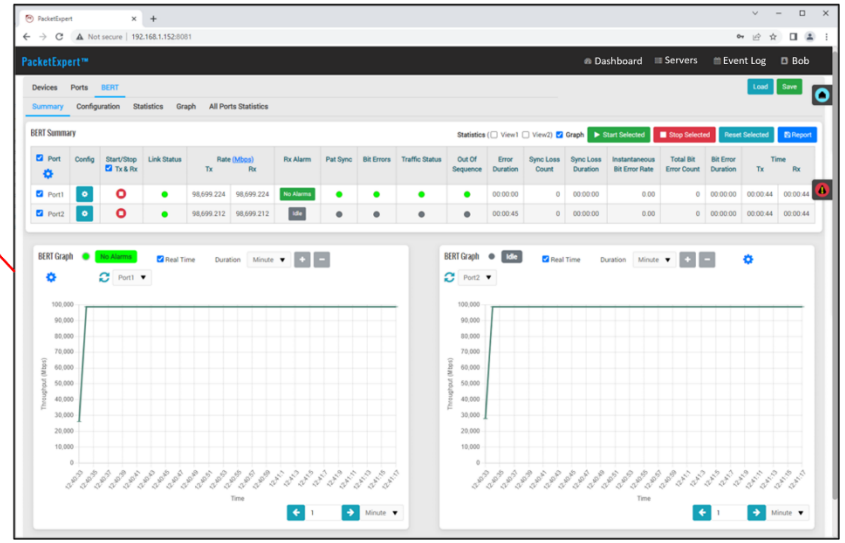


Web Server

Alex on Web Browser



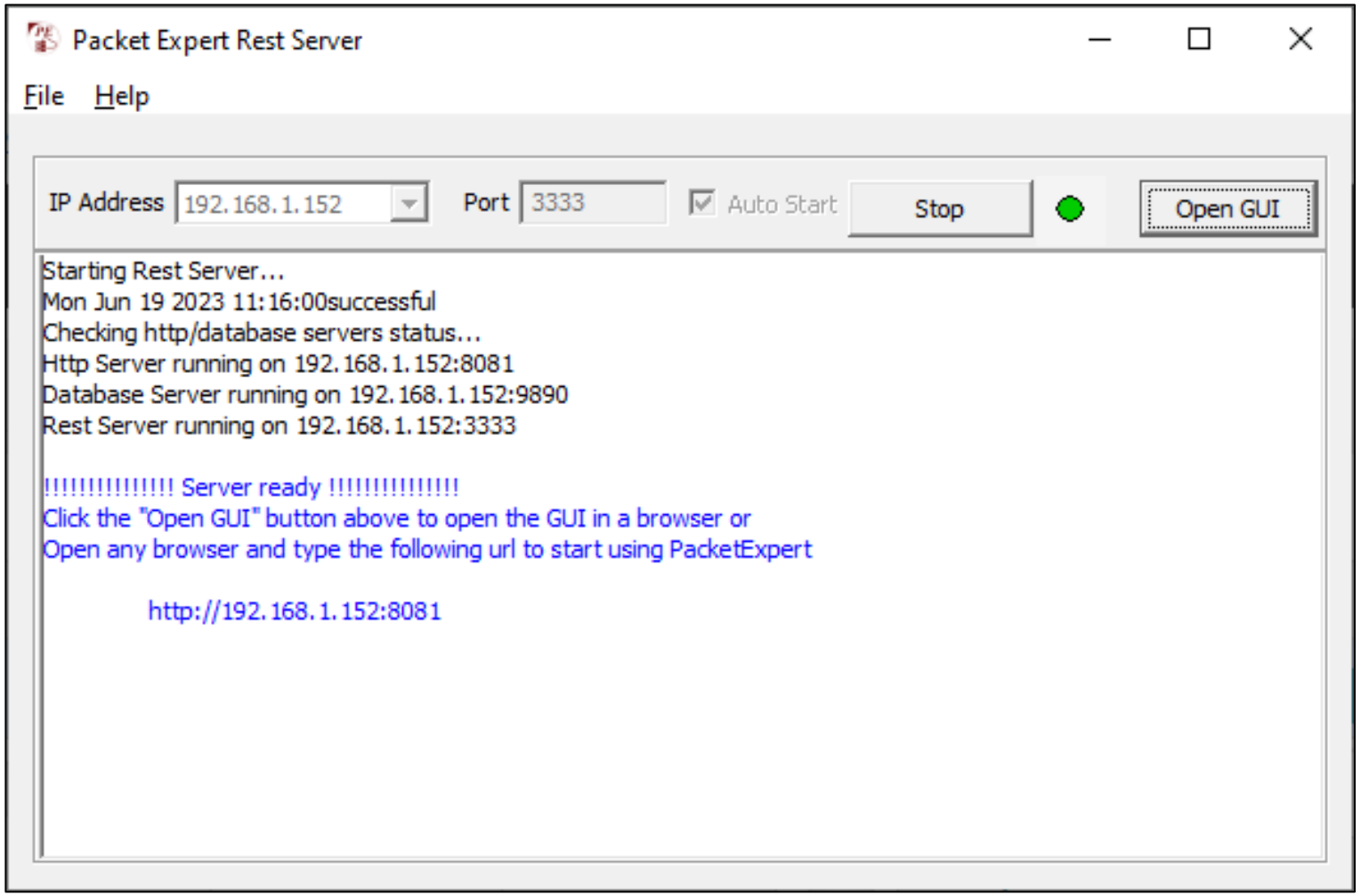

Bob on Web Browser




GL Communications

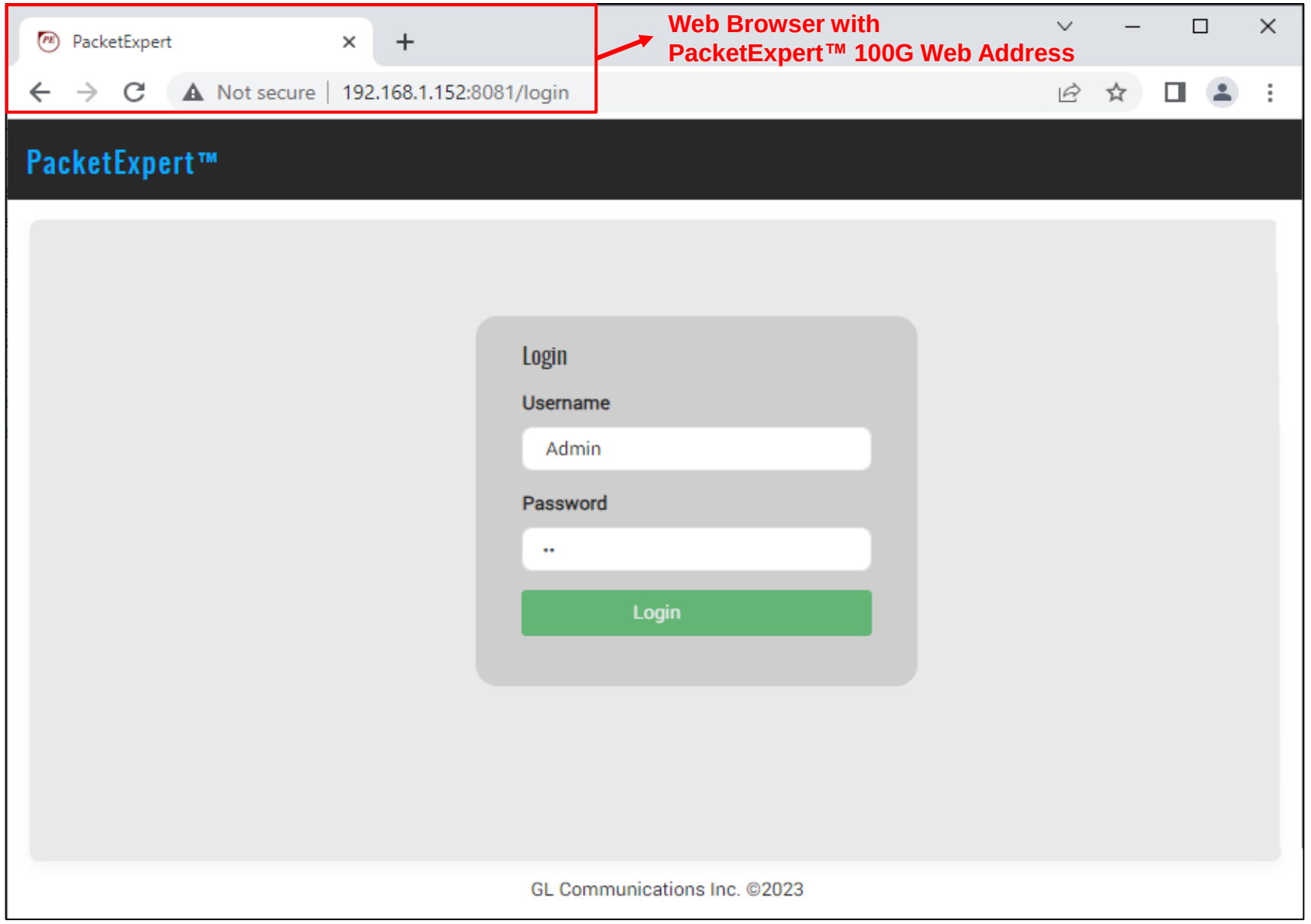
# PacketExpert™ 100G Rest / Web Server

- Click the **Open GUI** button to open the PacketExpert™100G Web interface through the default browser



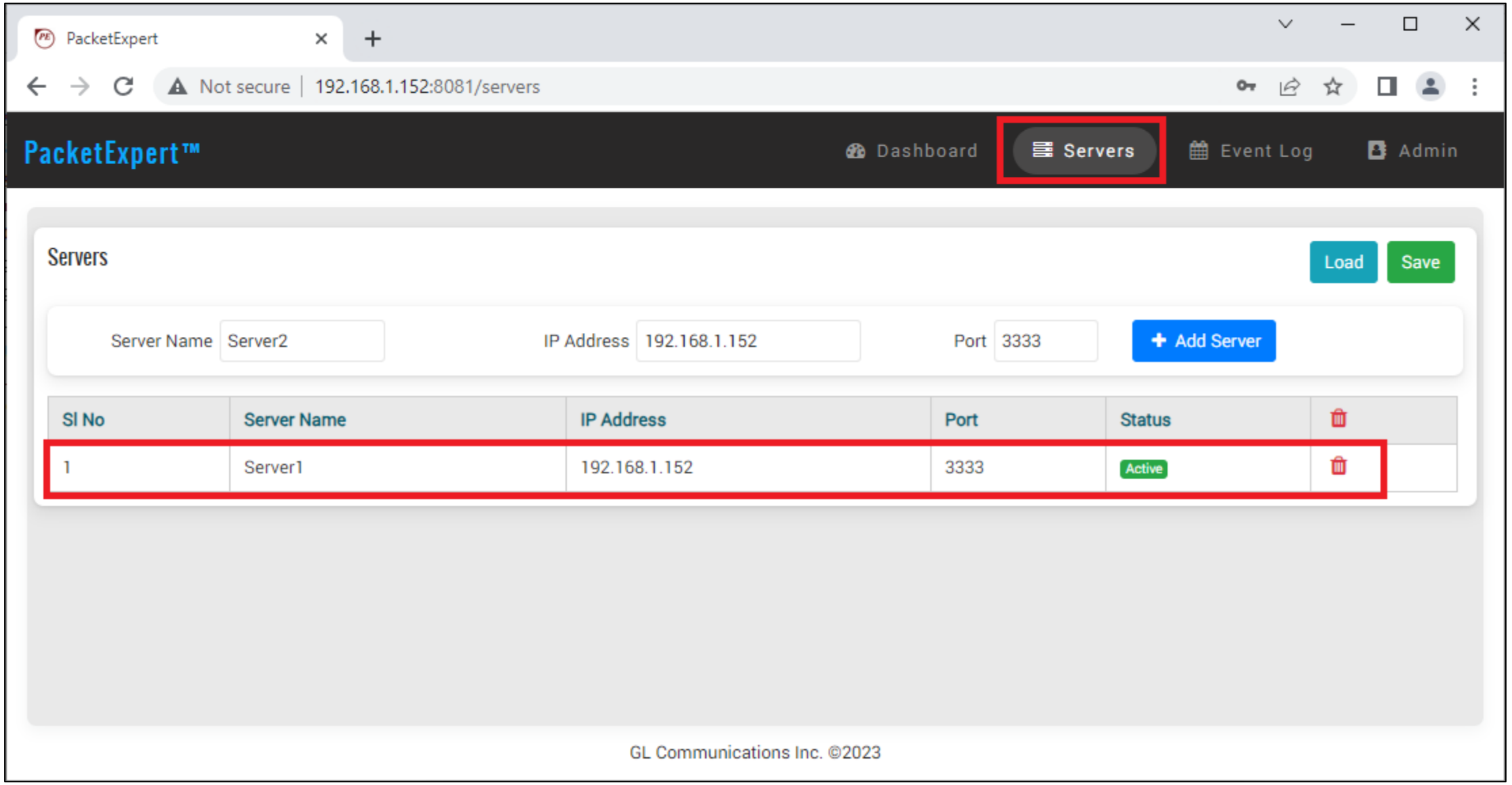

GL Communications

# PacketExpert™ 100G Login Page



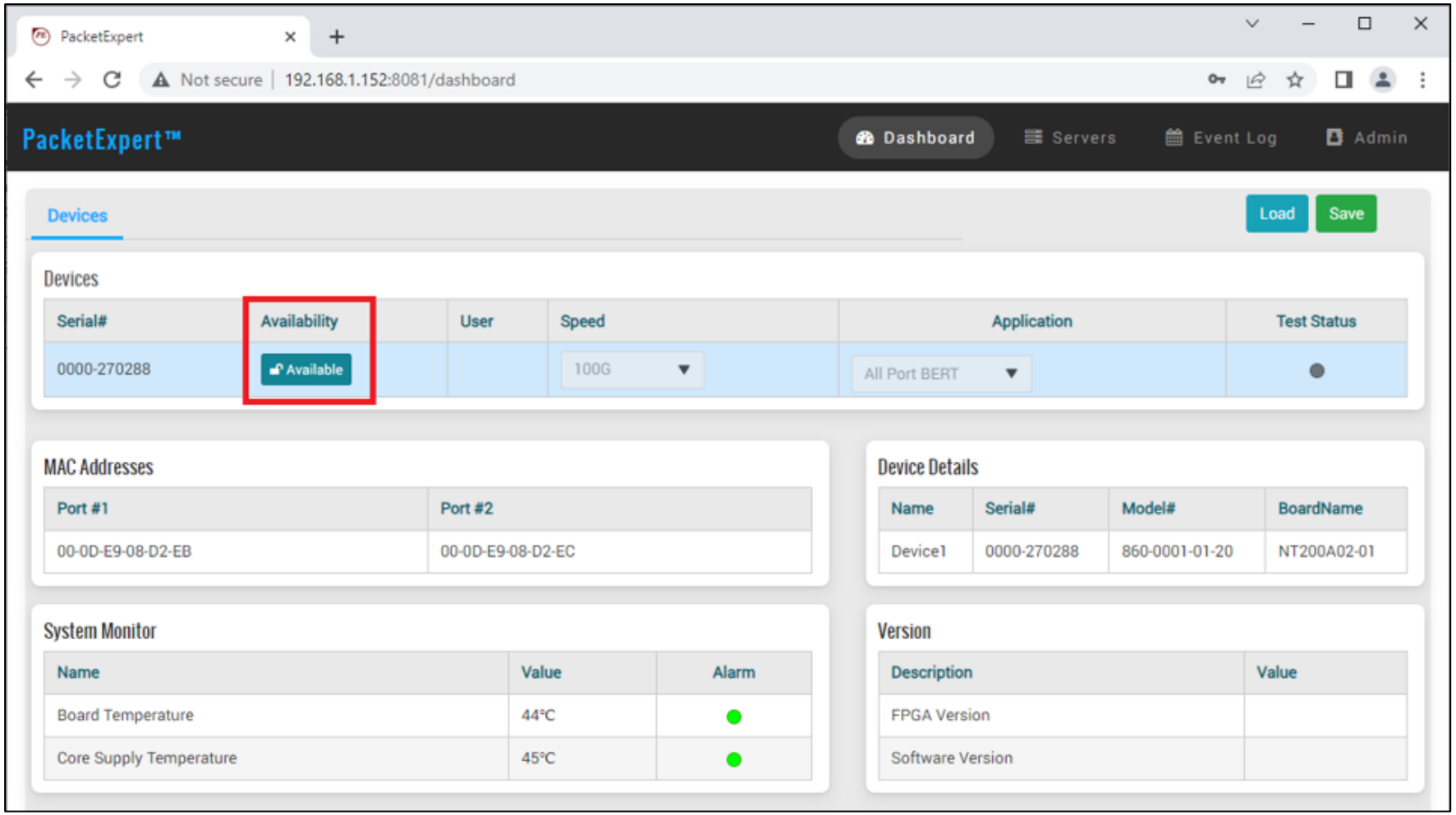

GL Communications

# Servers Window



# Device Availability

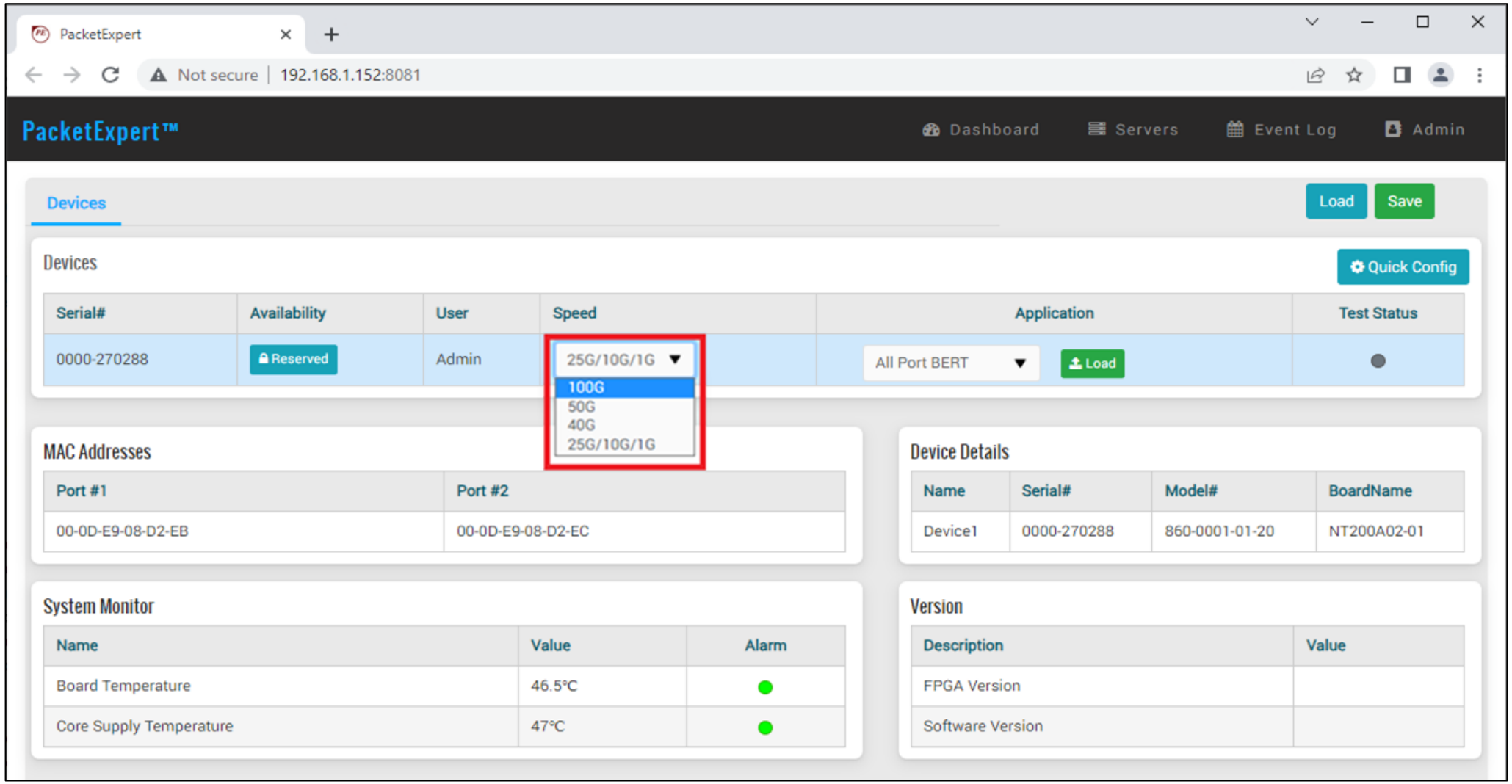
- **Availability**: Indicates whether the PacketExpert™ 100G application is available for the test, or it is reserved
- If it is **Available**, indicates the device which is connected to the server is Available for the test. Click the **Available** option to make the device Reserved
- If it is **Reserved**, indicates the PacketExpert™ 100G device is in use




GL Communications

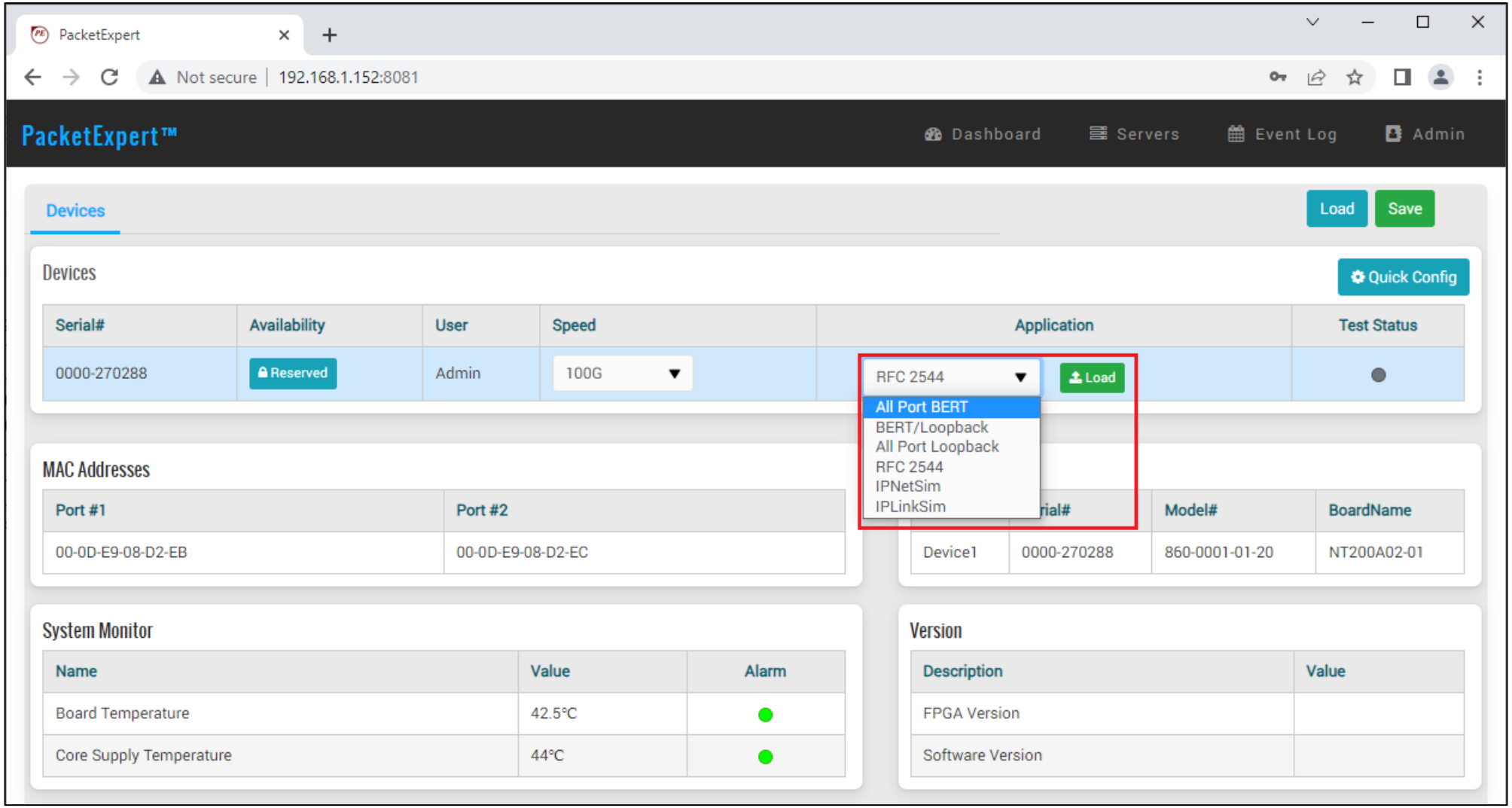
# Loading Speed

- Click on '**Devices**' and under the '**Speed**' drop-down menu select the desired rates



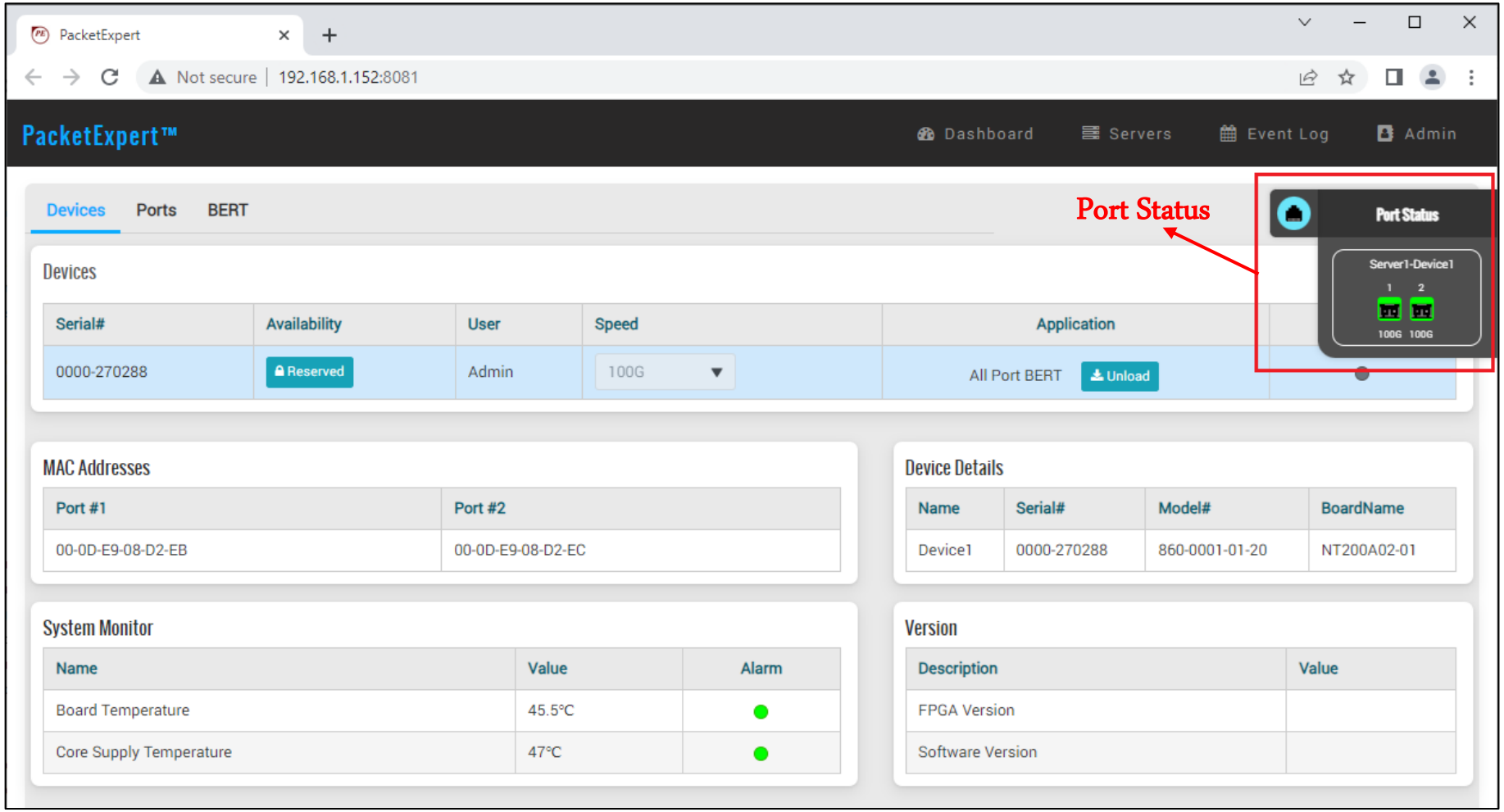
# Loading Applications

- Click on '**Devices**' and under the '**Application**' drop-down menu select the desired test



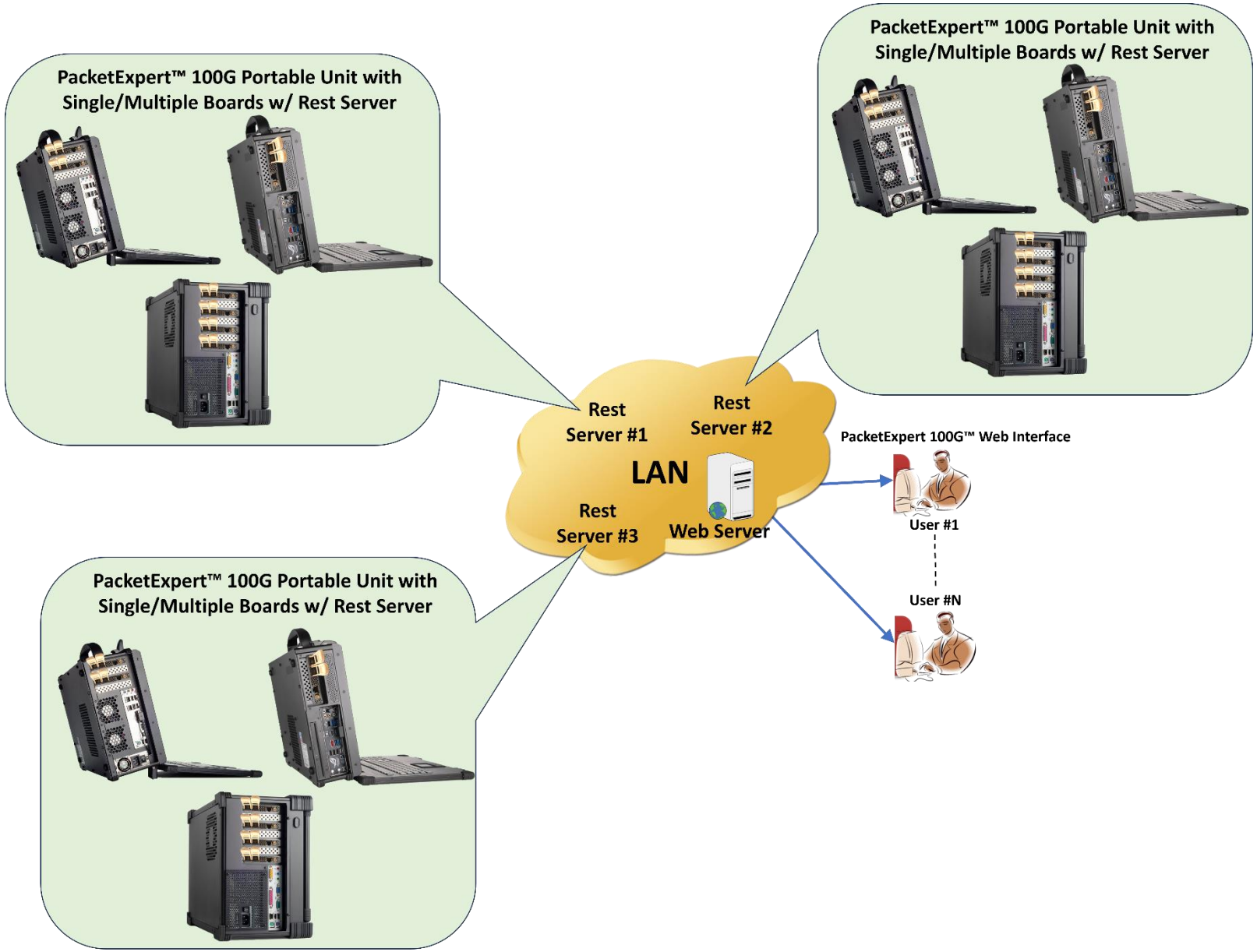
# Port Status

- Display the connected port status
- Once the application is loaded, the Port Status icon appear in the top right corner of the interface
- **Green** indicates the link is **Up**
- **Red** indicates the link is **Down**



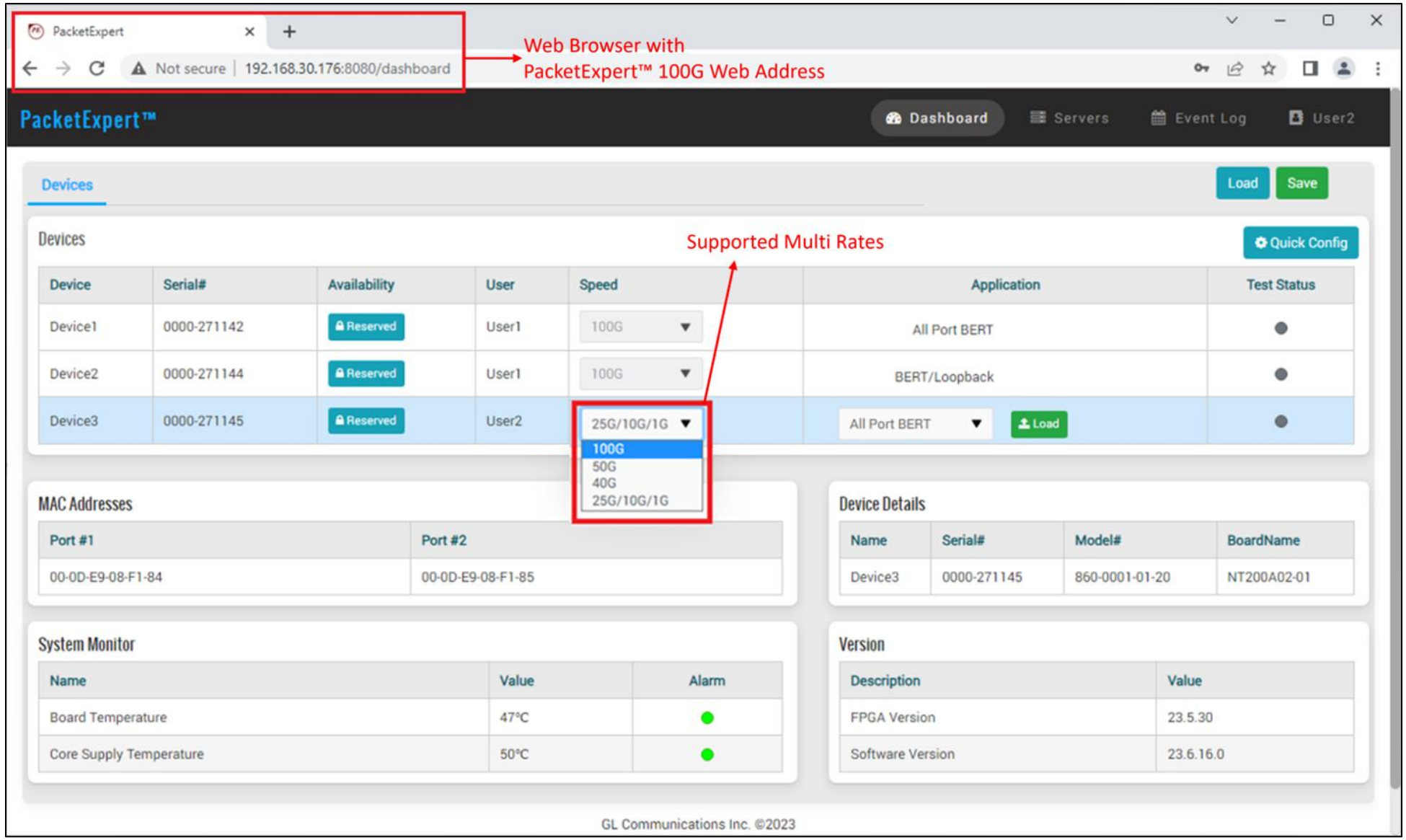

GL Communications

# PacketExpert™ 100G - Multiple Users with Multiple Servers and Devices



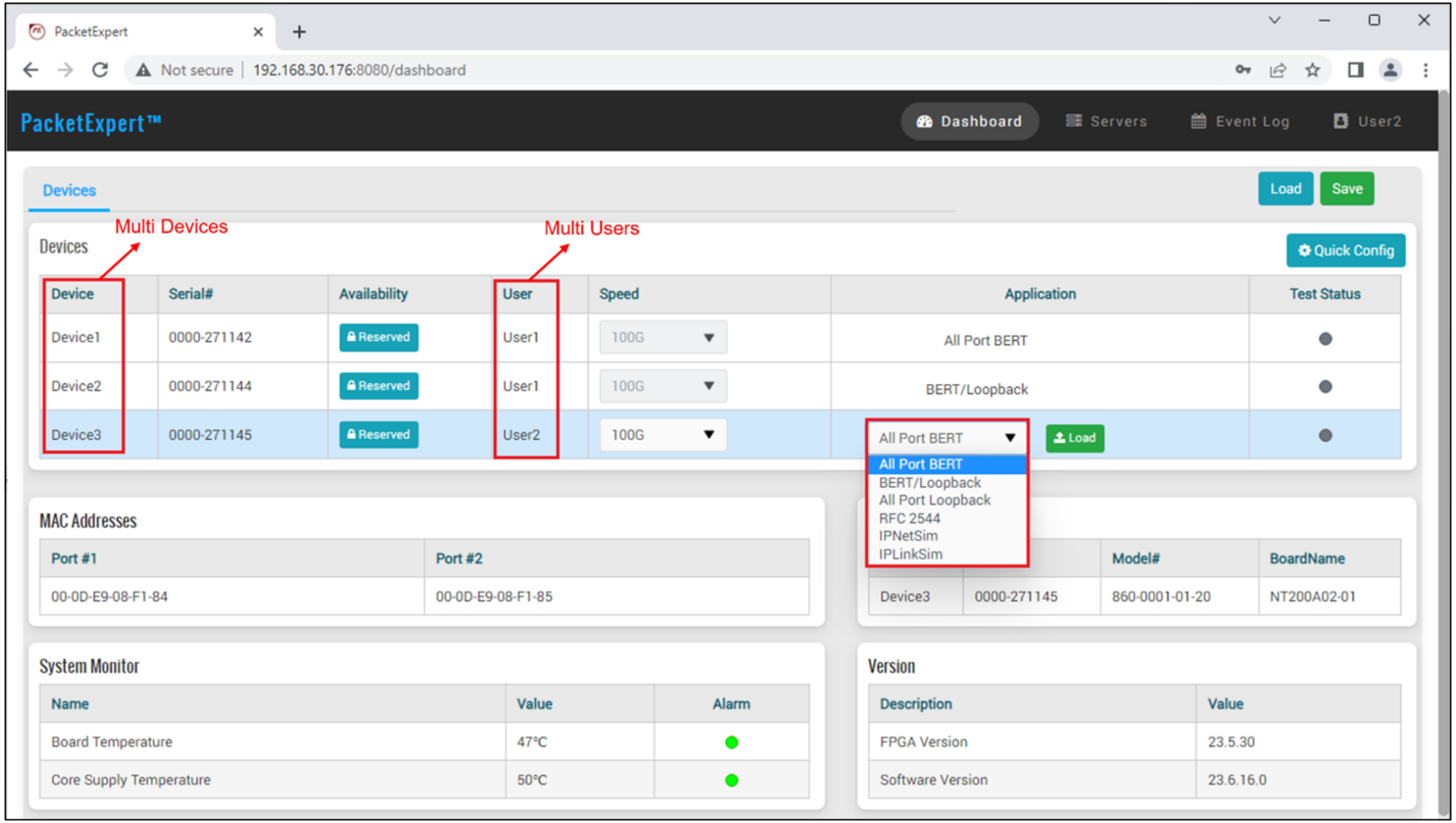
# Configuring PacketExpert™ for 1, 10, 25, 40, 50, & 100G Speeds

- Click on ‘Devices’ and under the ‘Speed’ drop-down menu select the desired rates



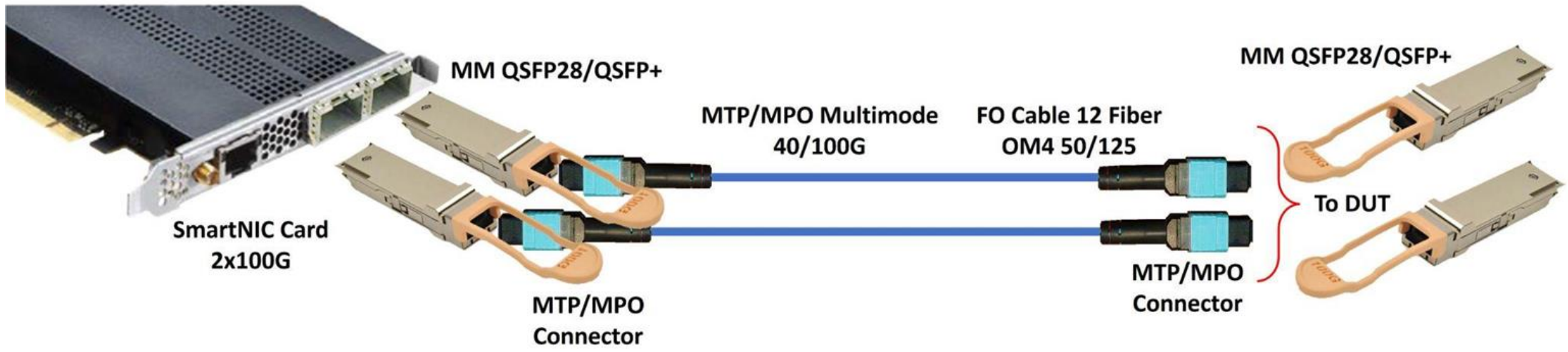
# Supported PacketExpert™ Applications

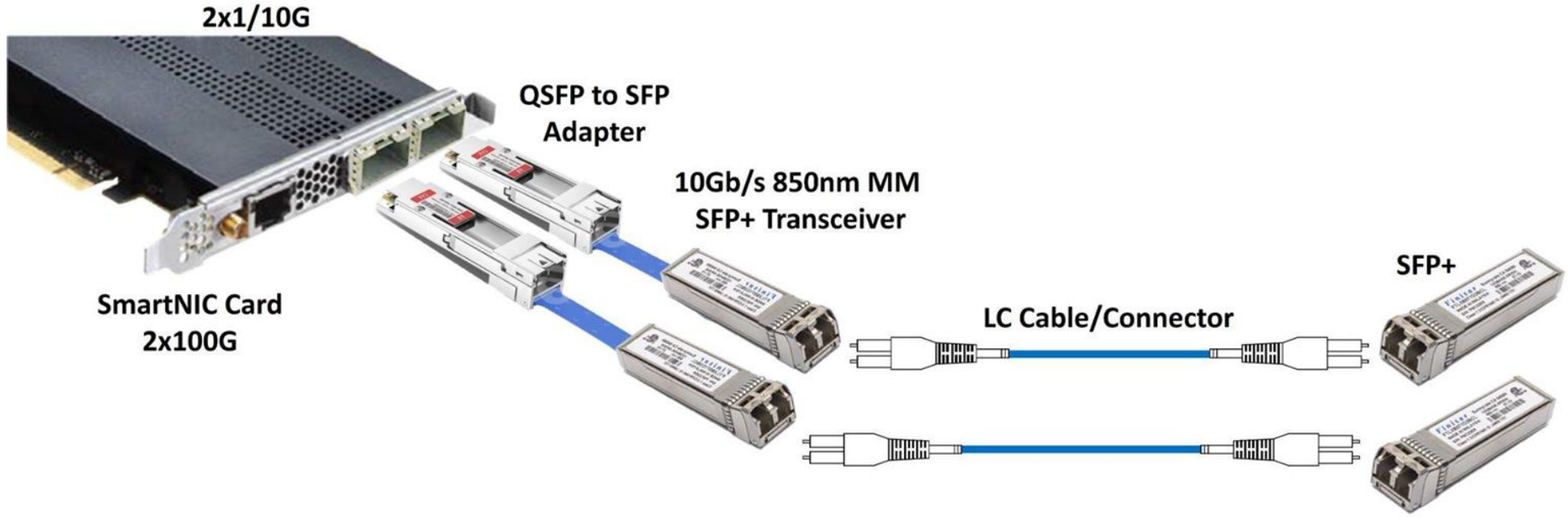
- Click on '**Devices**' and under the '**Application**' drop-down menu select the desired test




GL Communications

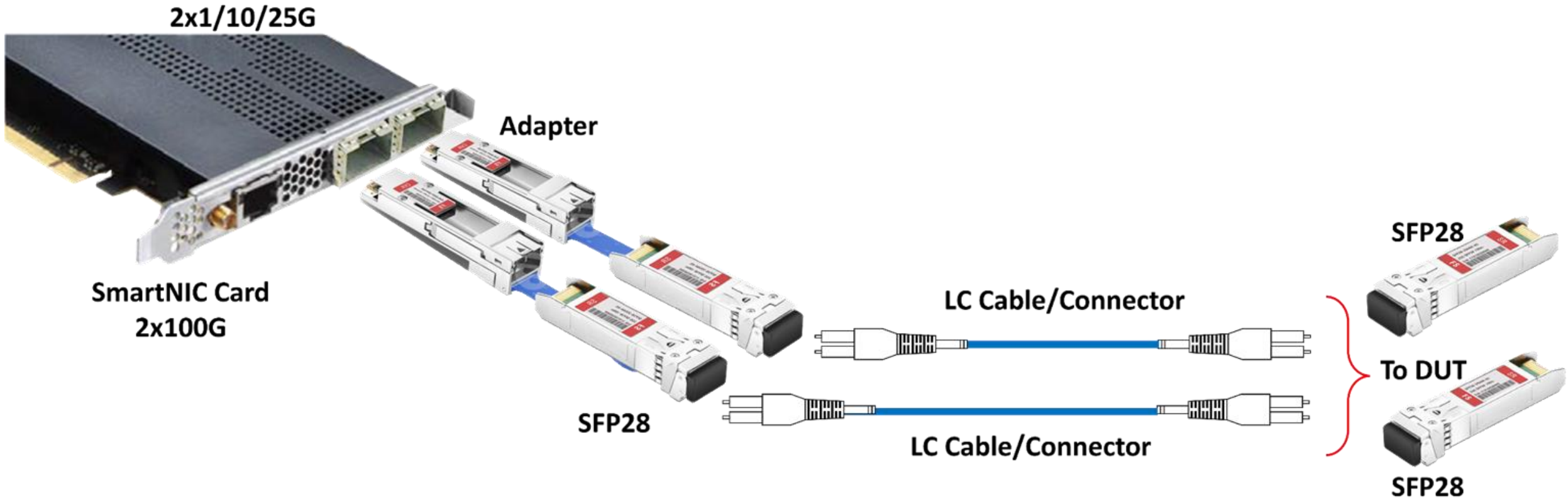
# 2x1/10, 2x40, 2x50, 2x100 Configuration for SmartNIC 2x40/100G




GL Communications

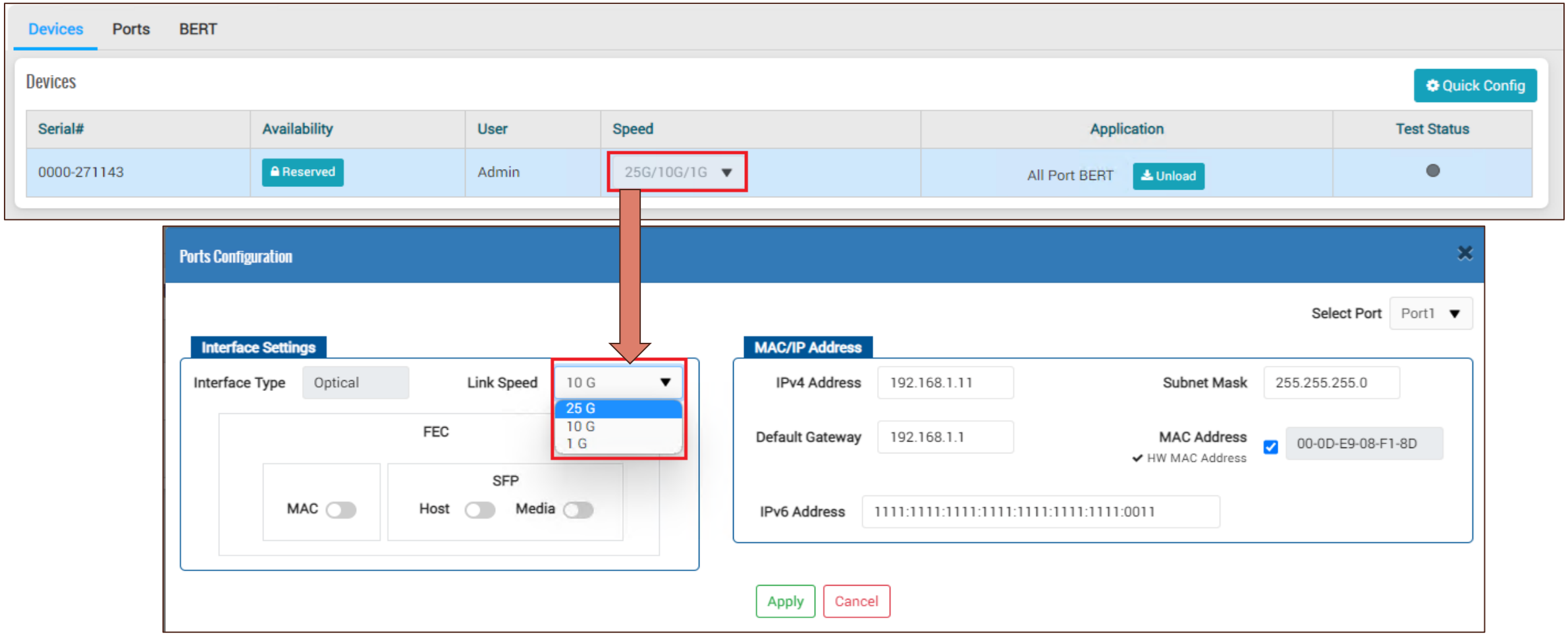
# 2x1/10/25G Configuration for SmartNIC 2x40/100G




GL Communications

# Configuring PacketExpert™ for 25G/10G/1G Speed

- To select 25G/10G/1G link speed, click on Devices tab and under Speed drop-down list select 25G/10G/1G speed, then load the application
- Now, go to Ports Configuration tab and select the required speed 25G/10G/1G as required



# Basic Software to Include 1G/10G/25G/40G/50G/100G Rates

- All Port BERT
- RFC2544
- Smart Loopback
- BERT/Loopback
- Single Port RFC2544
- Dual Port RFC2544
- ExpertSAM™

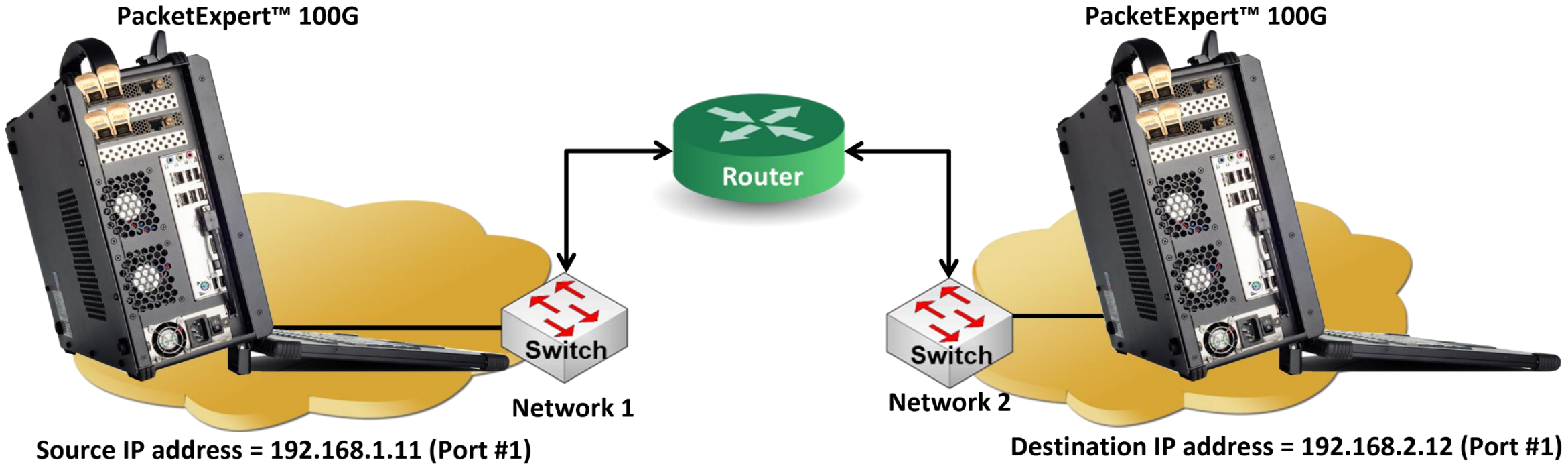
**Optional Software licenses includes all the above applications for 1G/10G/25G/40G/50G/100G rates**

GL Communications

# All Port BERT

# PacketExpert™ 100G - BER Test Setup at Layer 3 / 4

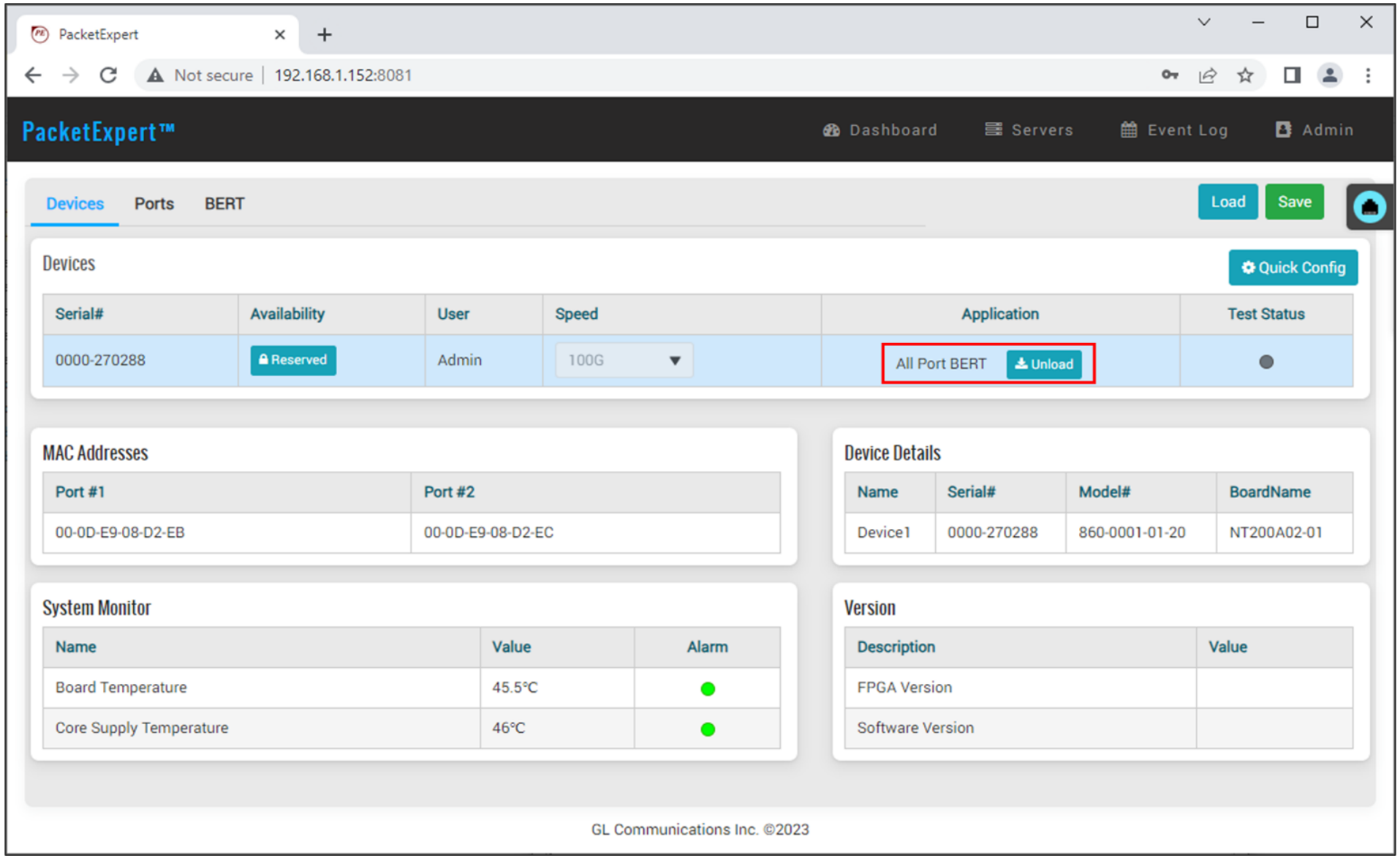
**Layer 3 Testing between PacketExpert™ located in different IP Networks**




- BERT test can be performed on various link speed such as **1G, 10G, 25G, or 100G**
- PacketExpert™ 100G can perform BERT across networks

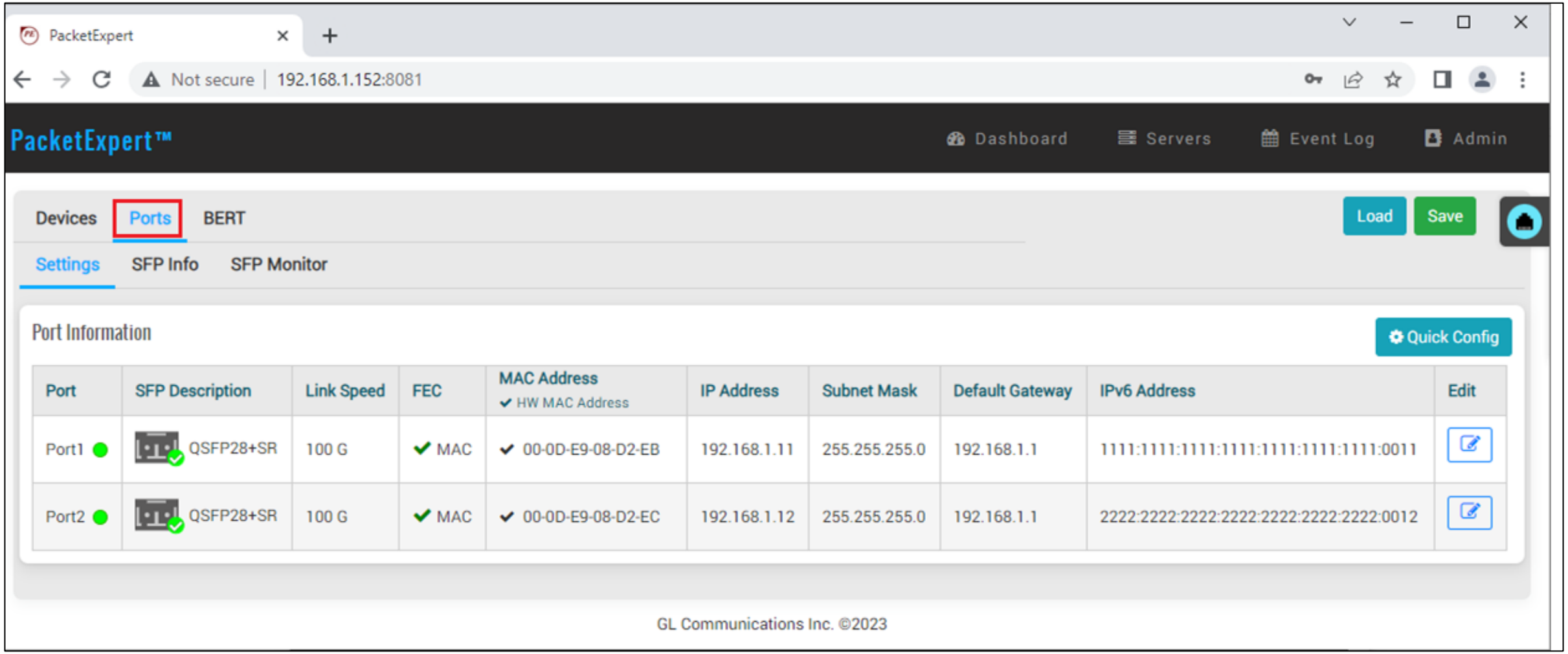
GL Communications

# Loading All Port BERT Application



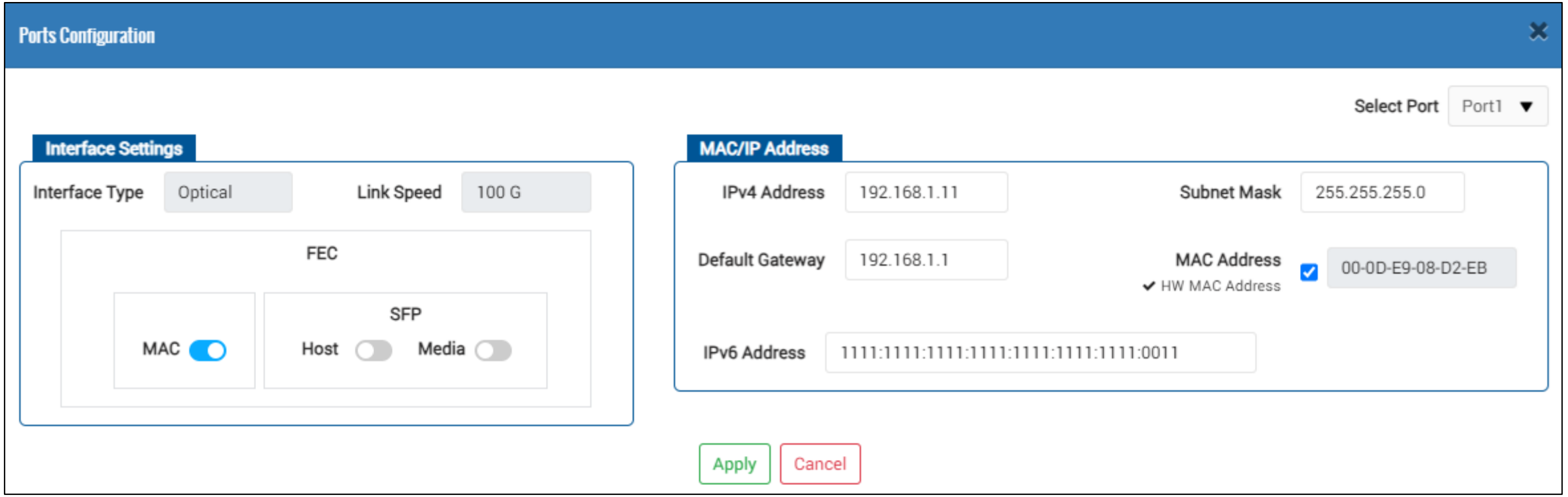

GL Communications

# Ports Settings



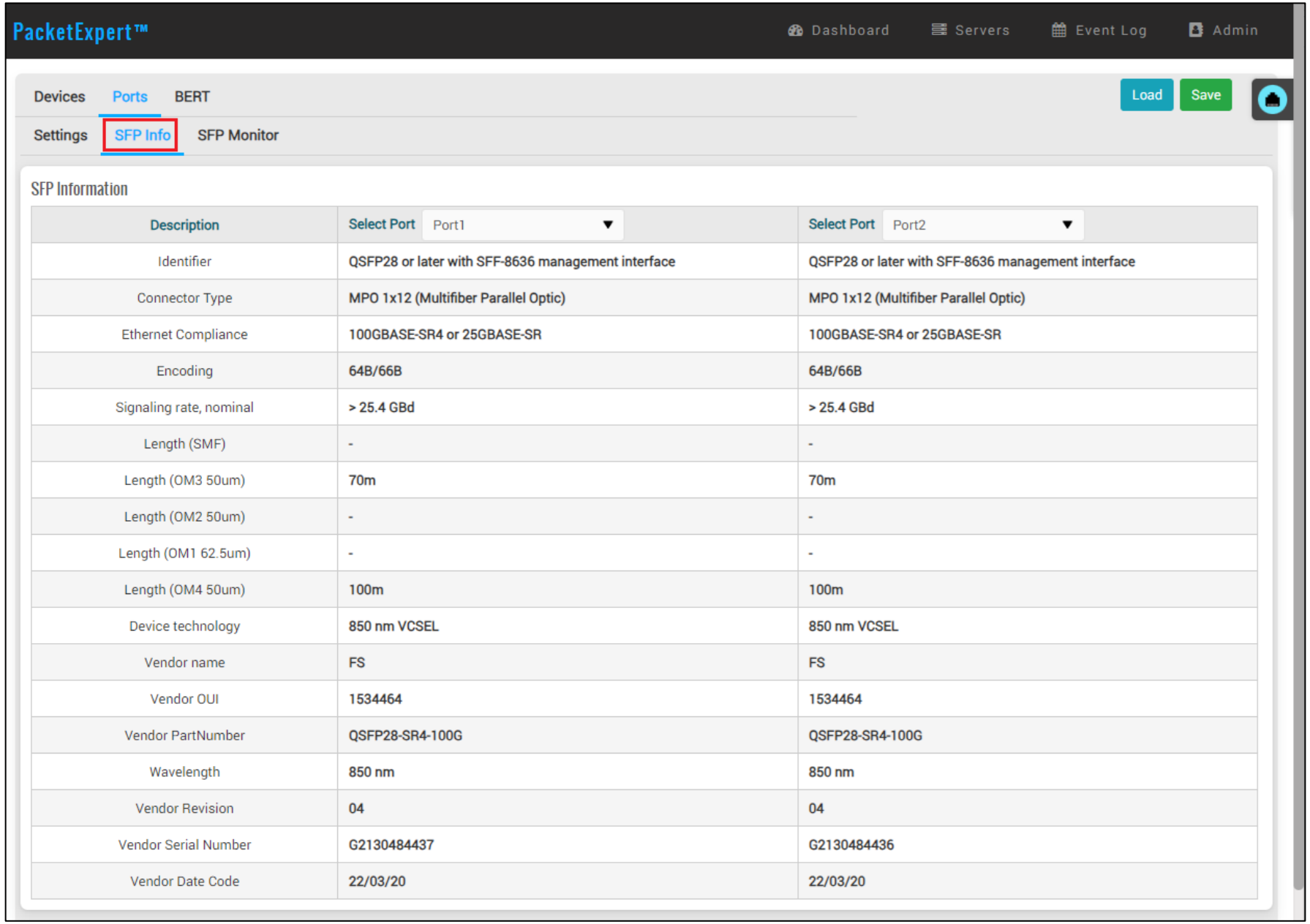

GL Communications

# Port Configurations



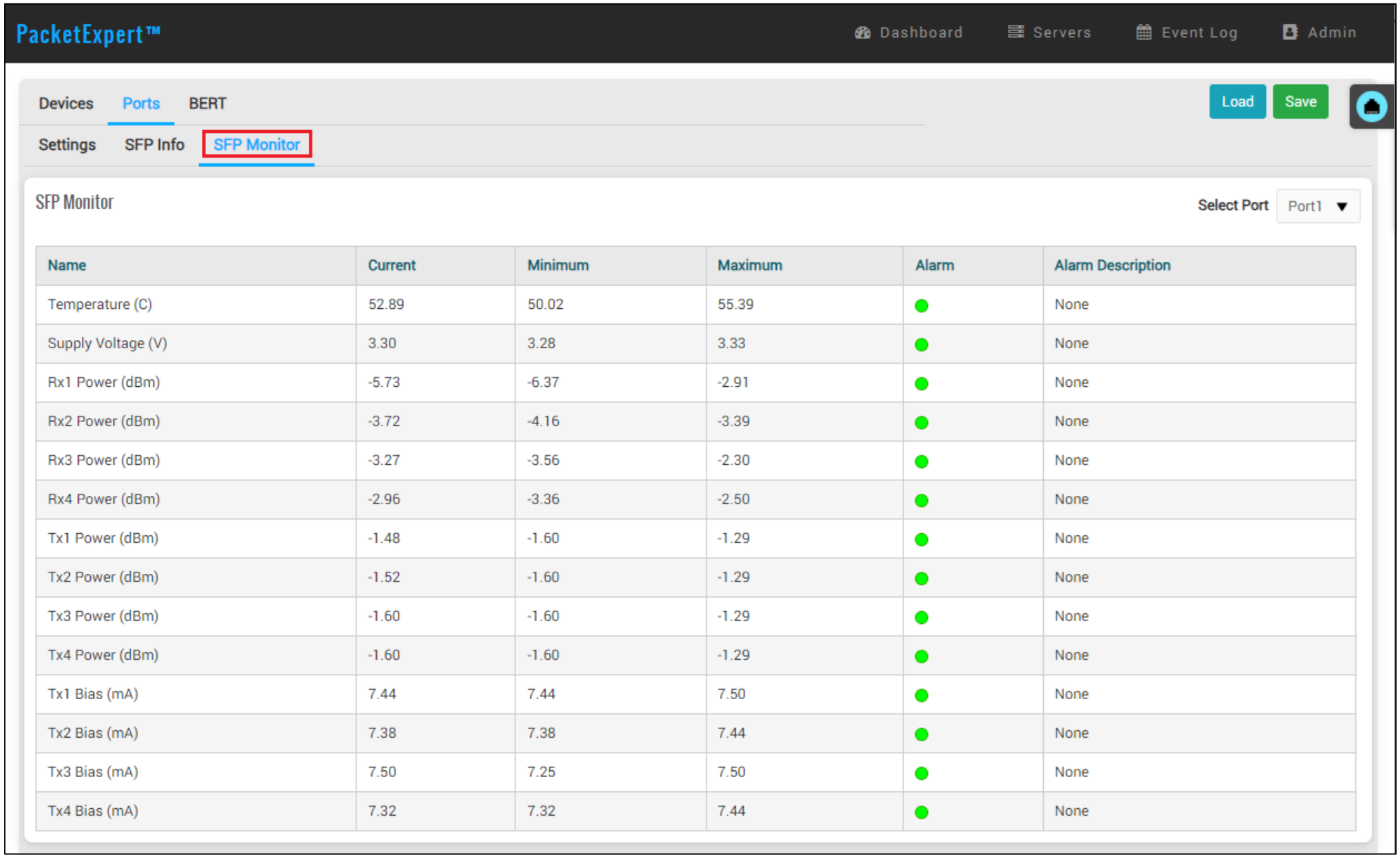

GL Communications

# Ports SFP Information



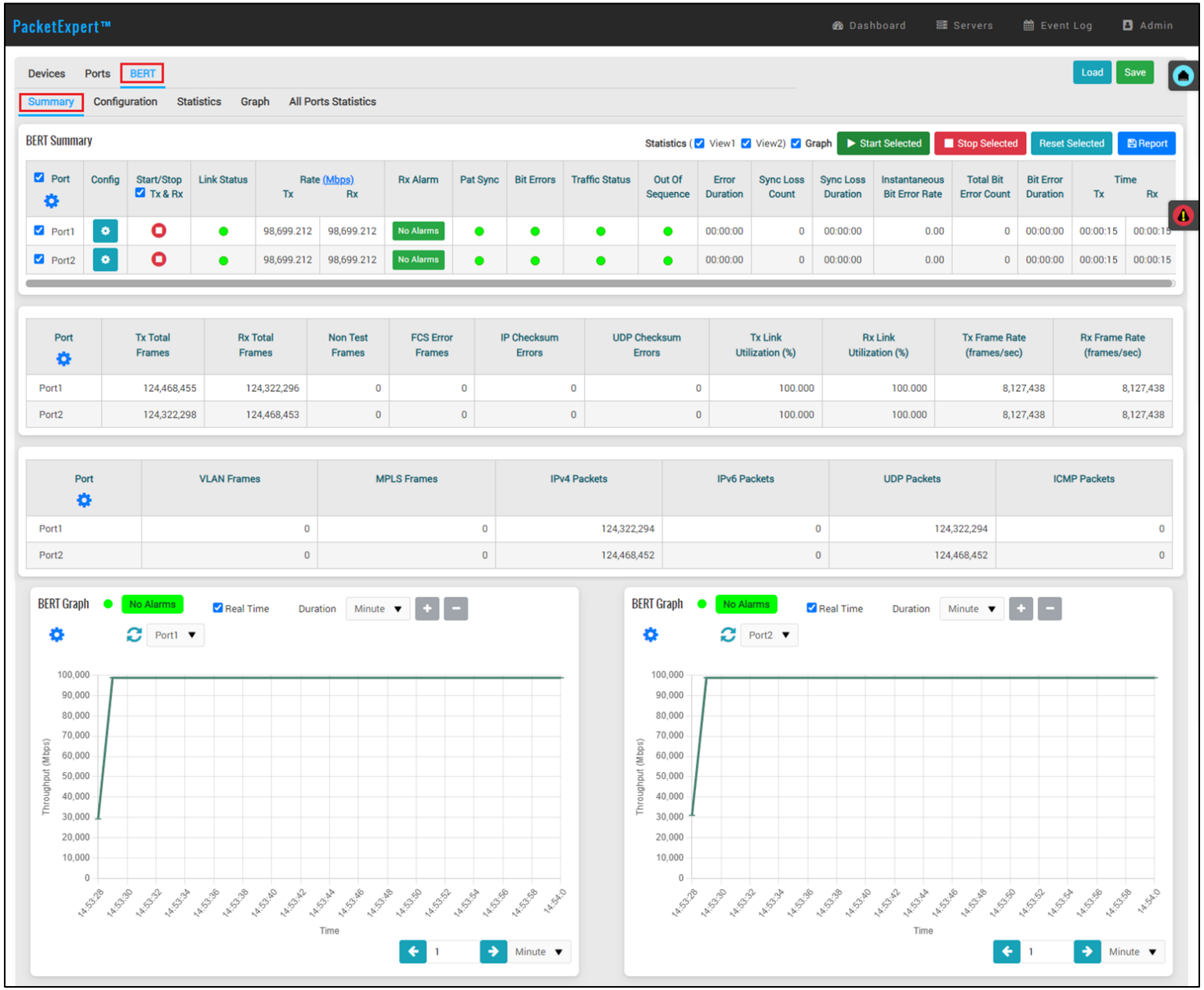

GL Communications

# Ports SFP Monitor Information

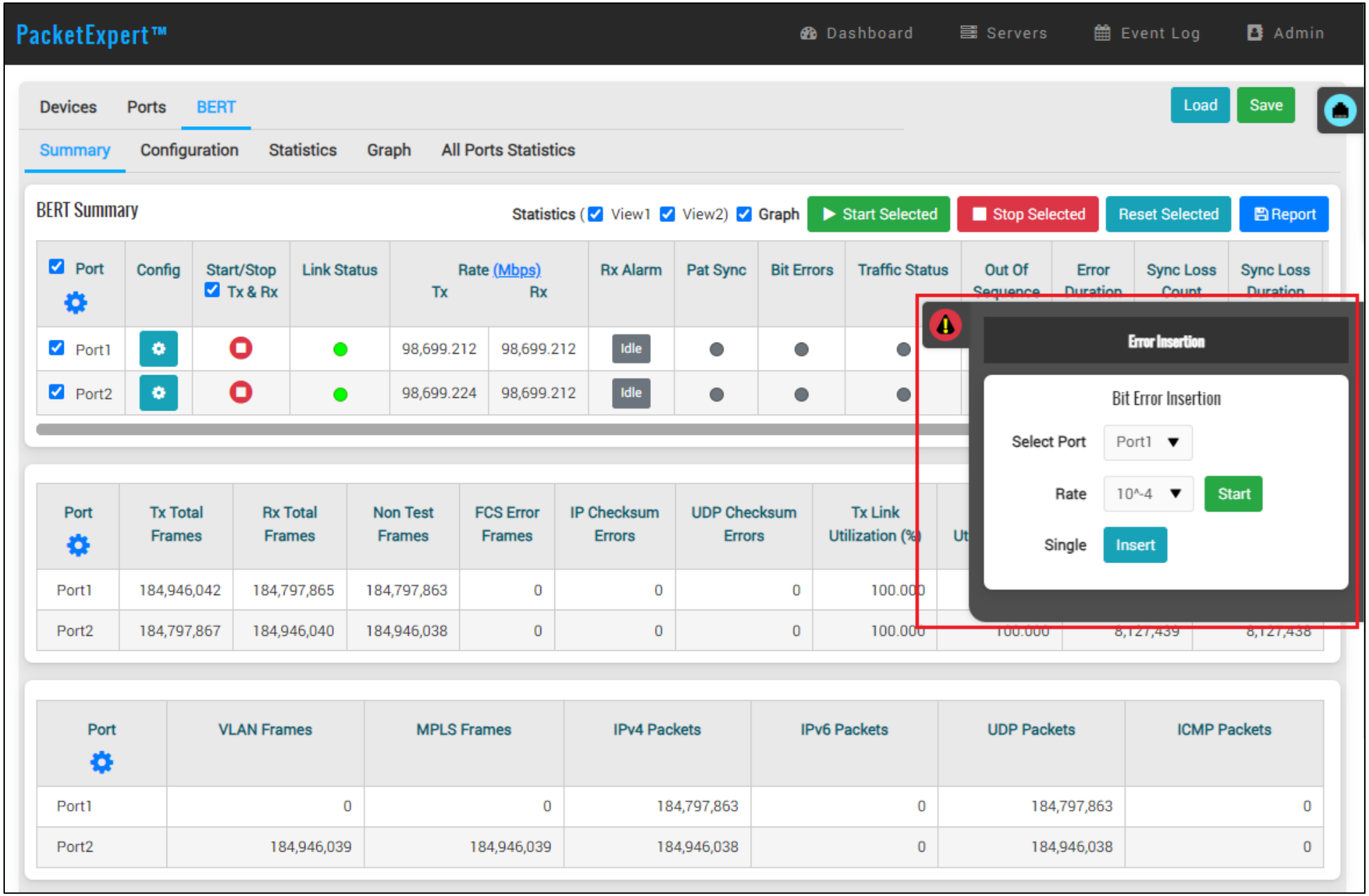



| Name | Current | Minimum | Maximum | Alarm | Alarm Description |
|---|---|---|---|---|---|
| Temperature (C) | 52.89 | 50.02 | 55.39 | | None |
| Supply Voltage (V) | 3.30 | 3.28 | 3.33 | | None |
| Rx1 Power (dBm) | -5.73 | -6.37 | -2.91 | | None |
| Rx2 Power (dBm) | -3.72 | -4.16 | -3.39 | | None |
| Rx3 Power (dBm) | -3.27 | -3.56 | -2.30 | | None |
| Rx4 Power (dBm) | -2.96 | -3.36 | -2.50 | | None |
| Tx1 Power (dBm) | -1.48 | -1.60 | -1.29 | | None |
| Tx2 Power (dBm) | -1.52 | -1.60 | -1.29 | | None |
| Tx3 Power (dBm) | -1.60 | -1.60 | -1.29 | | None |
| Tx4 Power (dBm) | -1.60 | -1.60 | -1.29 | | None |
| Tx1 Bias (mA) | 7.44 | 7.44 | 7.50 | | None |
| Tx2 Bias (mA) | 7.38 | 7.38 | 7.44 | | None |
| Tx3 Bias (mA) | 7.50 | 7.25 | 7.50 | | None |
| Tx4 Bias (mA) | 7.32 | 7.32 | 7.44 | | None |

# BERT Summary



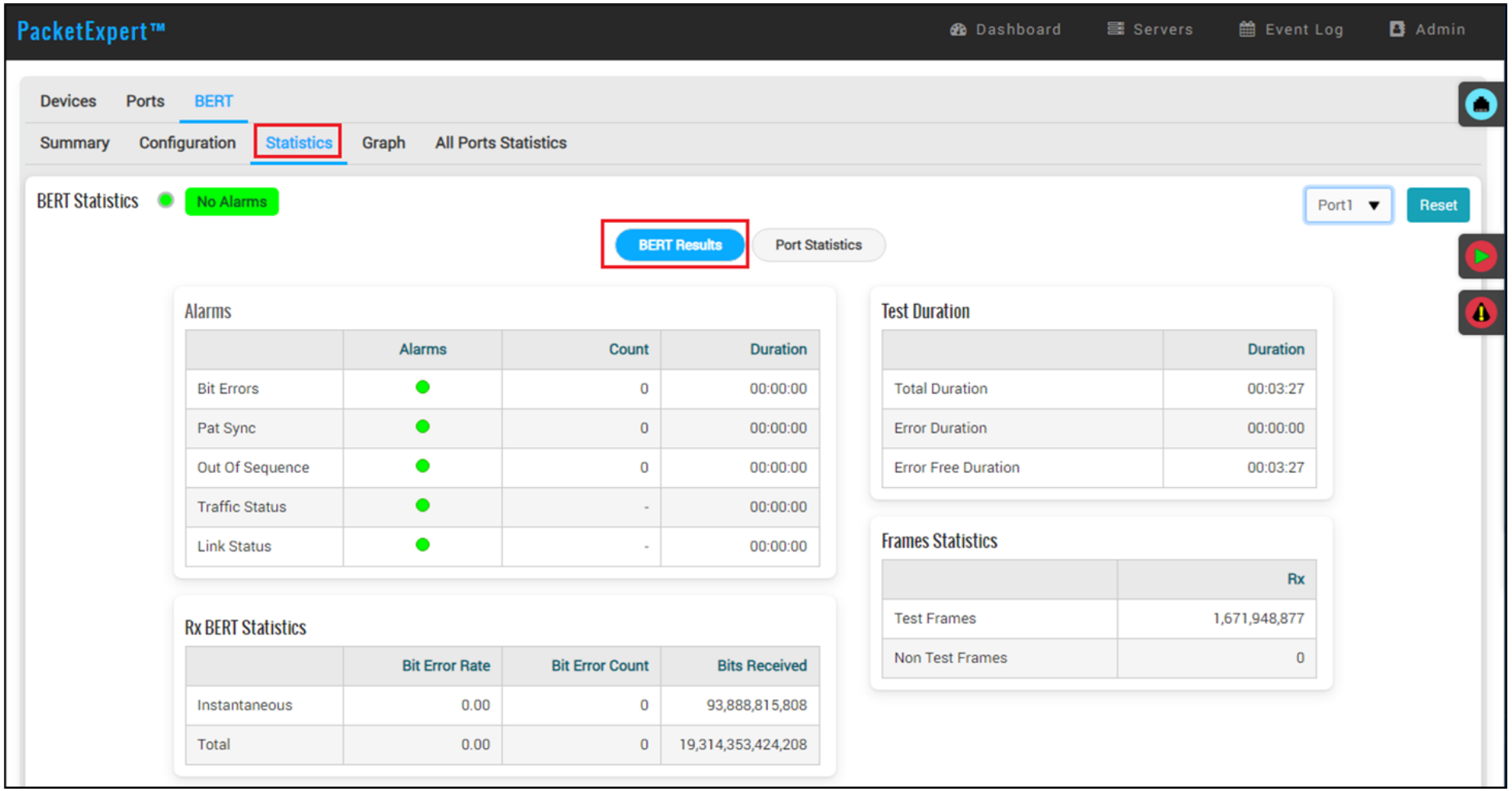
# BERT Configuration - Summary



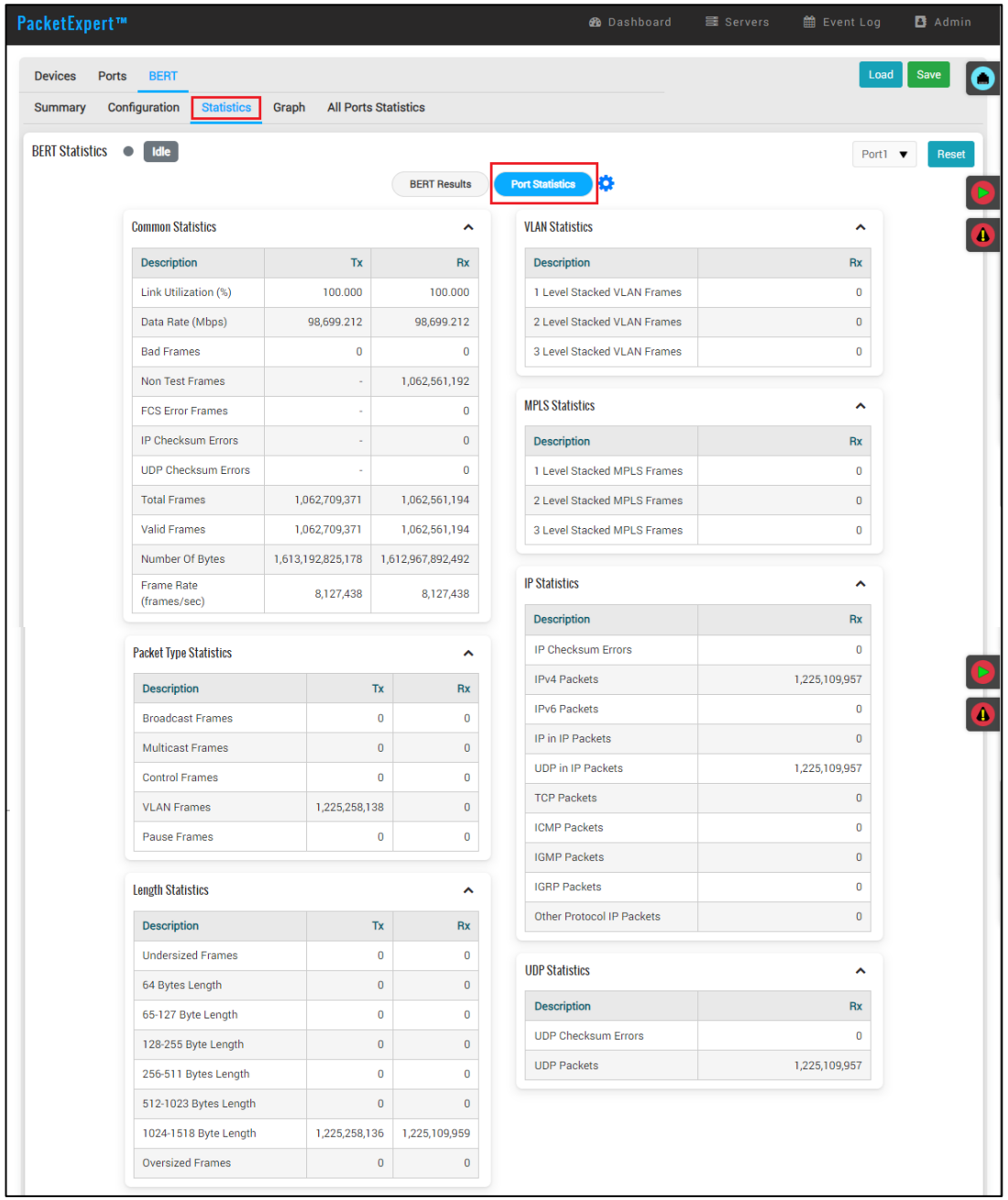

GL Communications

# BERT Results

- Users can measure out of sequence packets and packet loss through optional sequence number insertion feature
- Provides detailed BERT statistics such as Bit Error Count, Bit Error Rate, Bit Error Seconds and more

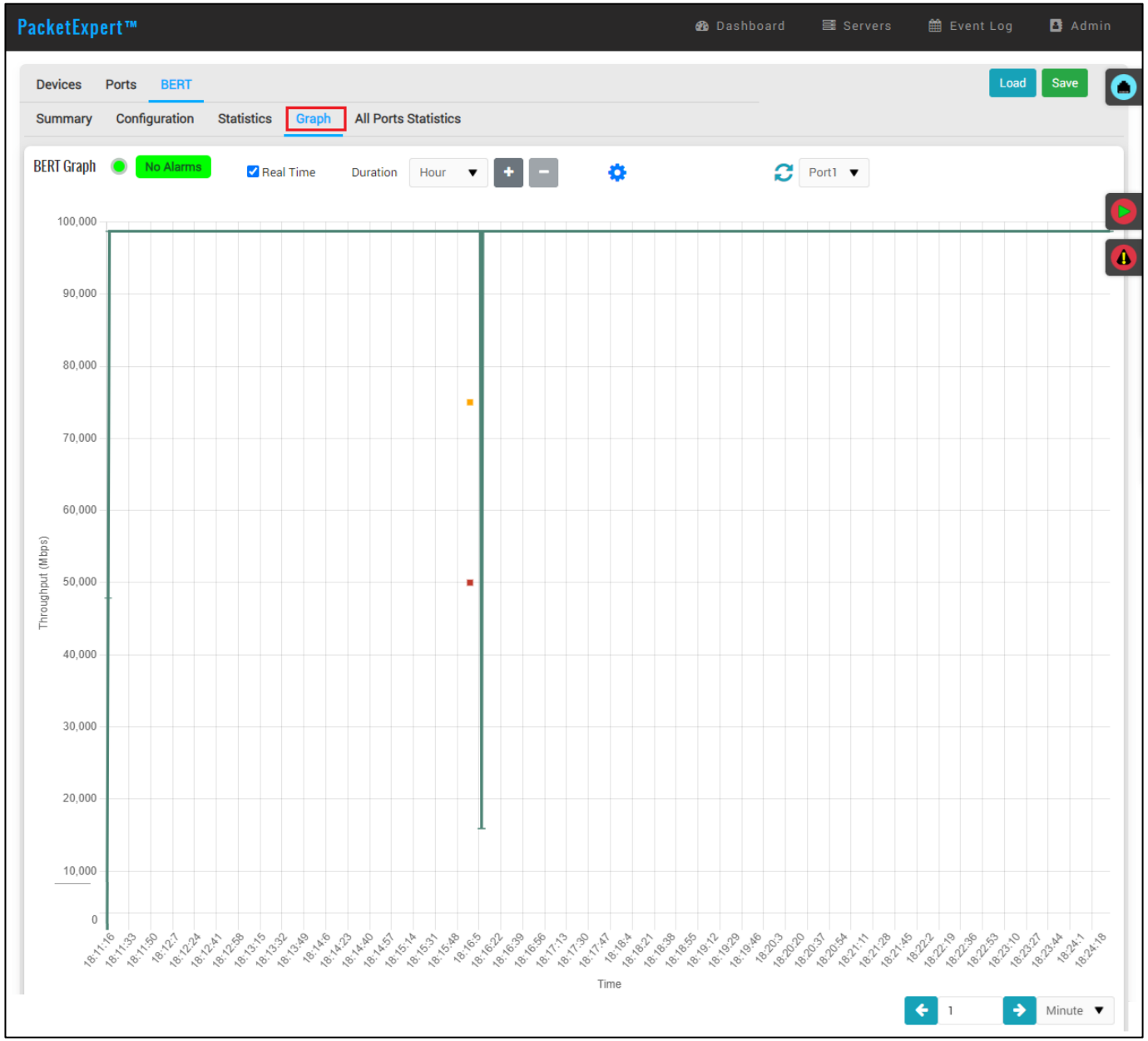


# Port Statistics

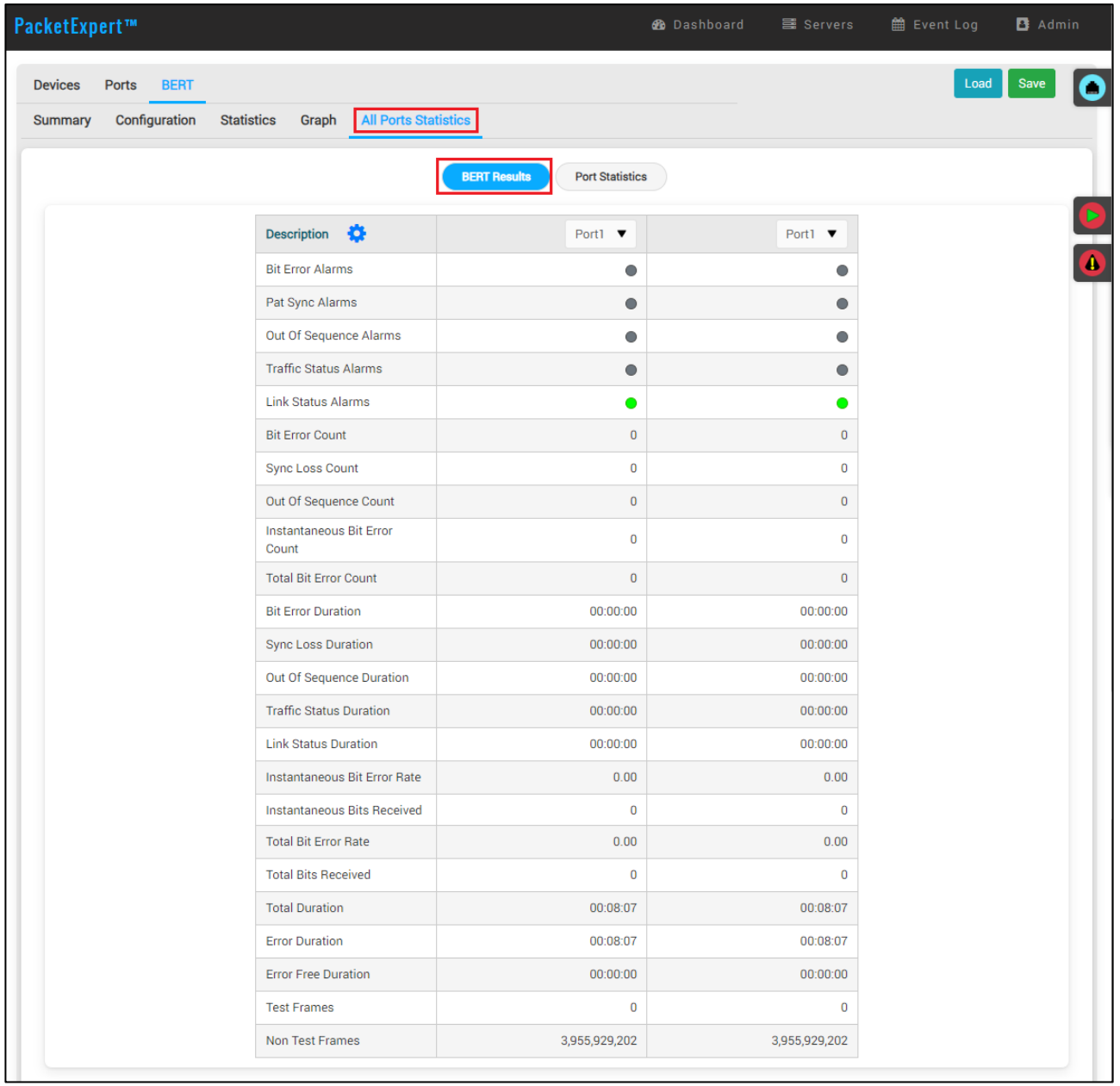



GL Communications

# BERT Graph


PacketExpert™
Dashboard
Servers
Event Log
Admin
Devices
Ports
BERT
Load
Save
Summary
Configuration
Statistics
Graph
All Ports Statistics
BERT Graph
No Alarms
Real Time
Duration
Hour
Port1
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Throughput (Mbps)
Time
1
Minute

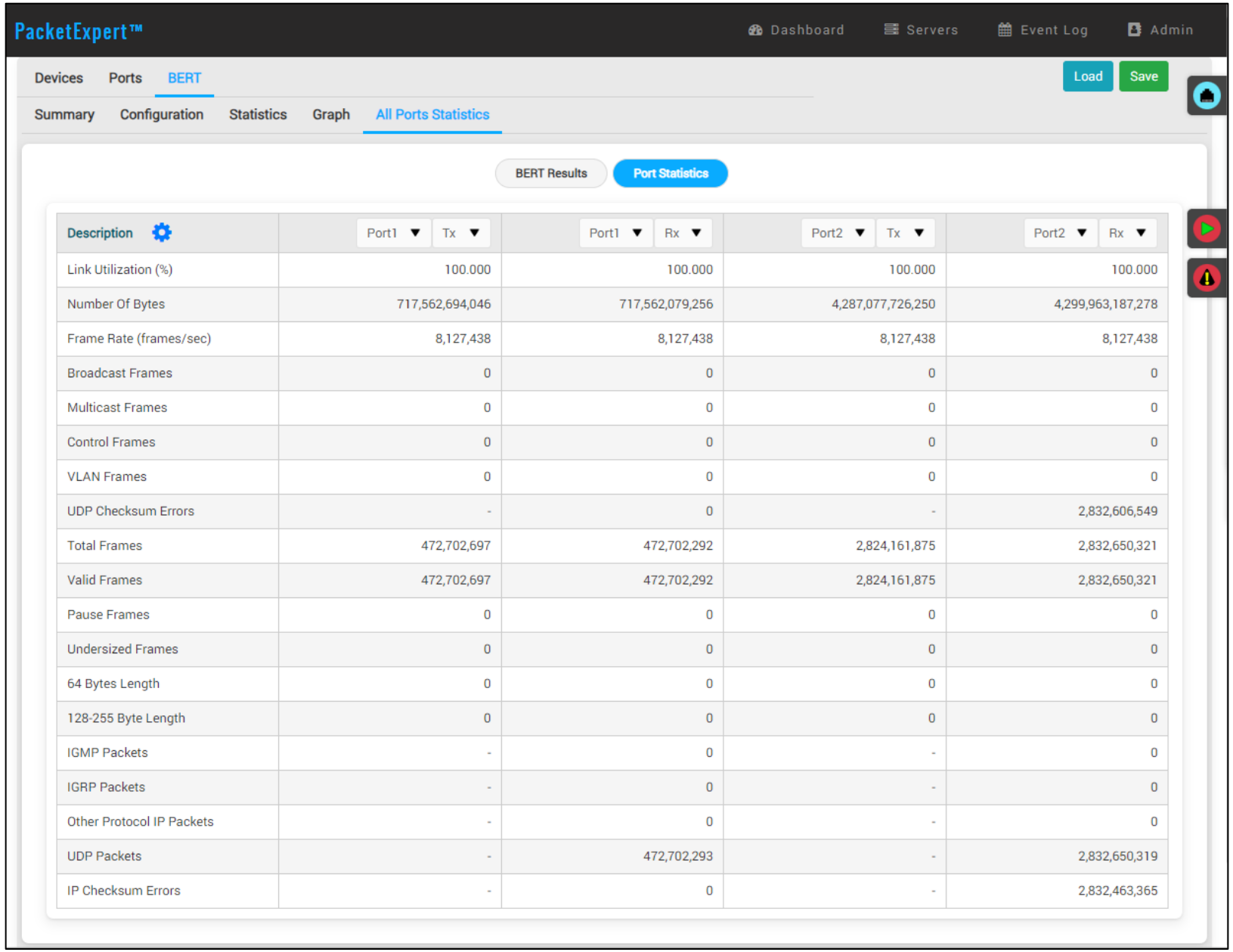
# All Ports BERT Results




| Description | Port1 | Port1 |
|---|---|---|
| Bit Error Alarms | | |
| Pat Sync Alarms | | |
| Out Of Sequence Alarms | | |
| Traffic Status Alarms | | |
| Link Status Alarms | | |
| Bit Error Count | 0 | 0 |
| Sync Loss Count | 0 | 0 |
| Out Of Sequence Count | 0 | 0 |
| Instantaneous Bit Error Count | 0 | 0 |
| Total Bit Error Count | 0 | 0 |
| Bit Error Duration | 00:00:00 | 00:00:00 |
| Sync Loss Duration | 00:00:00 | 00:00:00 |
| Out Of Sequence Duration | 00:00:00 | 00:00:00 |
| Traffic Status Duration | 00:00:00 | 00:00:00 |
| Link Status Duration | 00:00:00 | 00:00:00 |
| Instantaneous Bit Error Rate | 0.00 | 0.00 |
| Instantaneous Bits Received | 0 | 0 |
| Total Bit Error Rate | 0.00 | 0.00 |
| Total Bits Received | 0 | 0 |
| Total Duration | 00:08:07 | 00:08:07 |
| Error Duration | 00:08:07 | 00:08:07 |
| Error Free Duration | 00:00:00 | 00:00:00 |
| Test Frames | 0 | 0 |
| Non Test Frames | 3,955,929,202 | 3,955,929,202 |

GL Communications

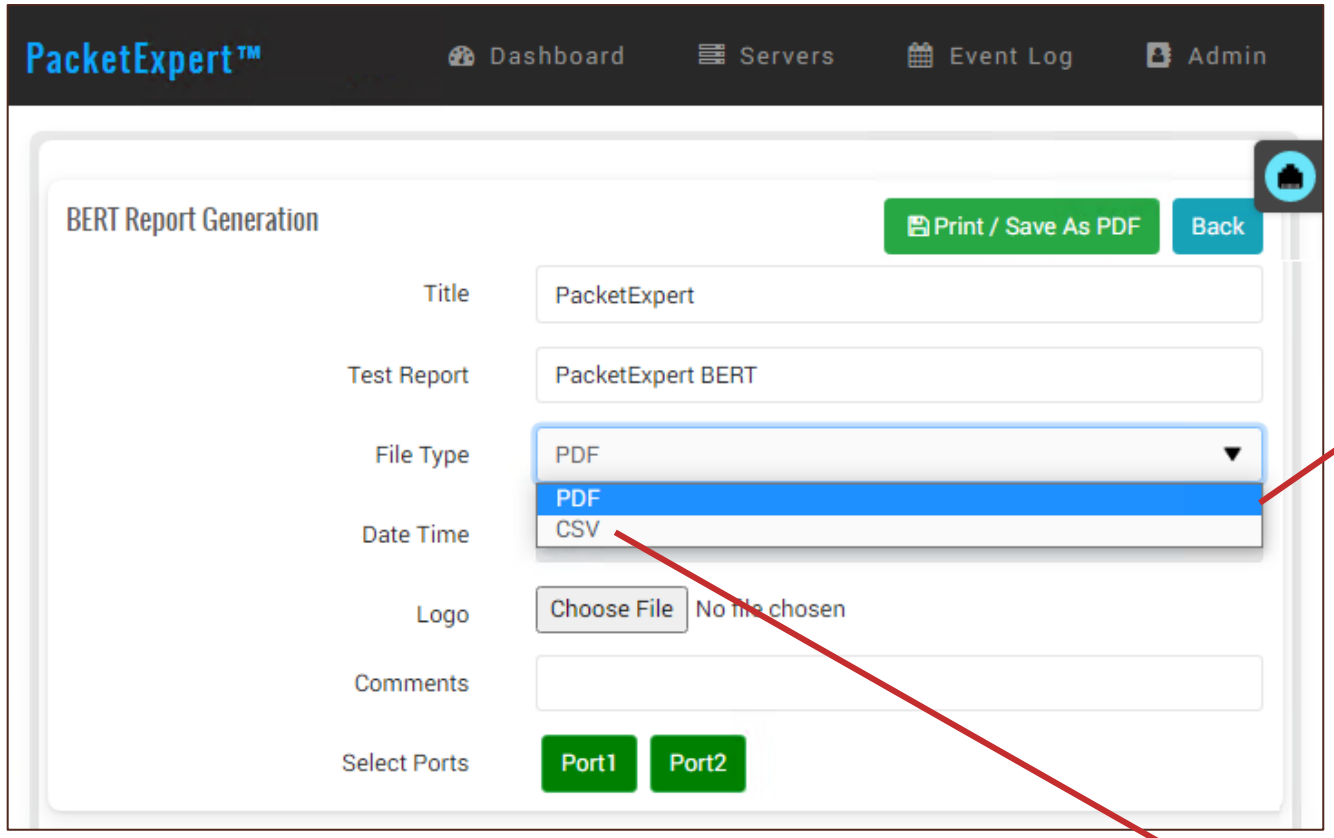
# All Ports Statistics

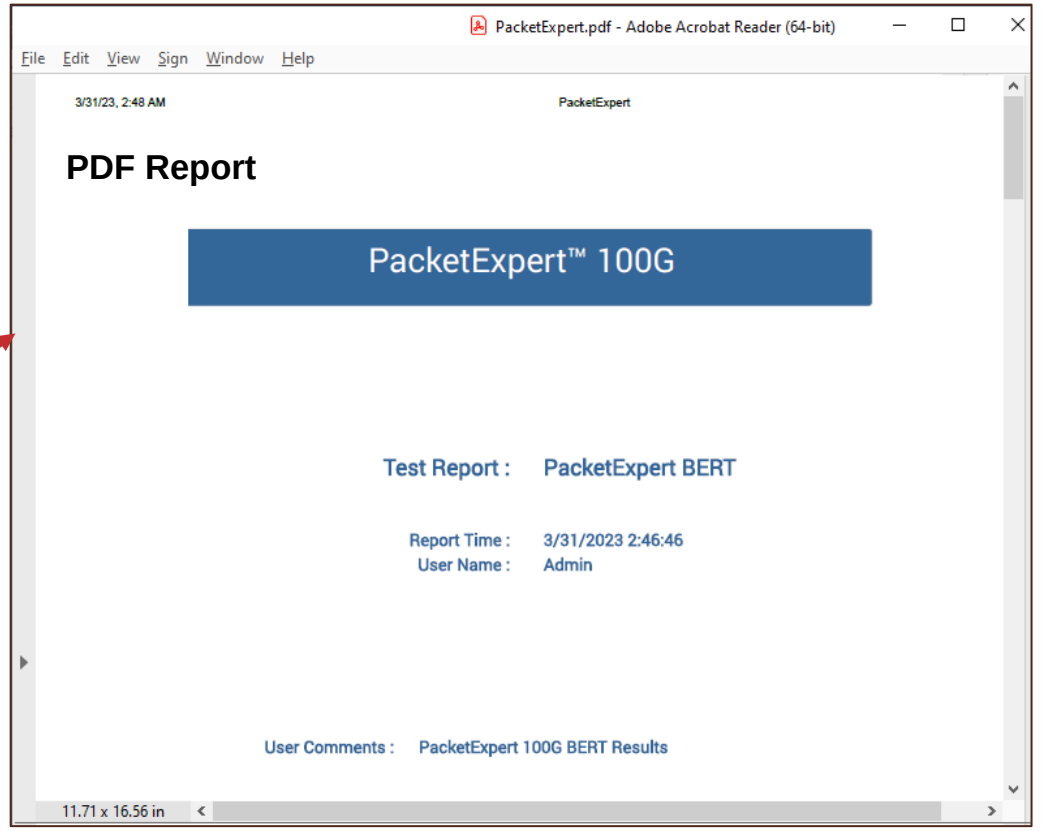


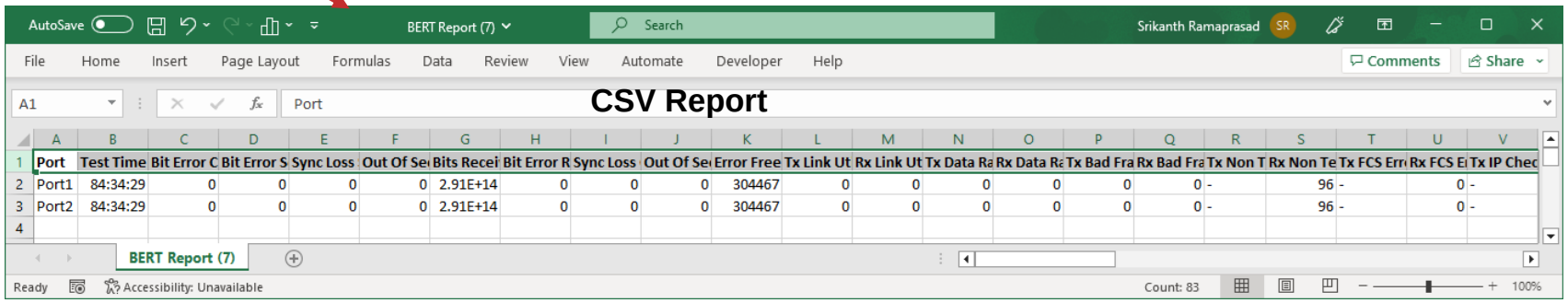

| Description | Port1 Tx | Port1 Rx | Port2 Tx | Port2 Rx |
|---|---|---|---|---|
| Link Utilization (%) | 100.000 | 100.000 | 100.000 | 100.000 |
| Number Of Bytes | 717,562,694,046 | 717,562,079,256 | 4,287,077,726,250 | 4,299,963,187,278 |
| Frame Rate (frames/sec) | 8,127,438 | 8,127,438 | 8,127,438 | 8,127,438 |
| Broadcast Frames | 0 | 0 | 0 | 0 |
| Multicast Frames | 0 | 0 | 0 | 0 |
| Control Frames | 0 | 0 | 0 | 0 |
| VLAN Frames | 0 | 0 | 0 | 0 |
| UDP Checksum Errors | - | 0 | - | 2,832,606,549 |
| Total Frames | 472,702,697 | 472,702,292 | 2,824,161,875 | 2,832,650,321 |
| Valid Frames | 472,702,697 | 472,702,292 | 2,824,161,875 | 2,832,650,321 |
| Pause Frames | 0 | 0 | 0 | 0 |
| Undersized Frames | 0 | 0 | 0 | 0 |
| 64 Bytes Length | 0 | 0 | 0 | 0 |
| 128-255 Byte Length | 0 | 0 | 0 | 0 |
| IGMP Packets | - | 0 | - | 0 |
| IGRP Packets | - | 0 | - | 0 |
| Other Protocol IP Packets | - | 0 | - | 0 |
| UDP Packets | - | 472,702,293 | - | 2,832,650,319 |
| IP Checksum Errors | - | 0 | - | 2,832,463,365 |

GL Communications

# Report Generation



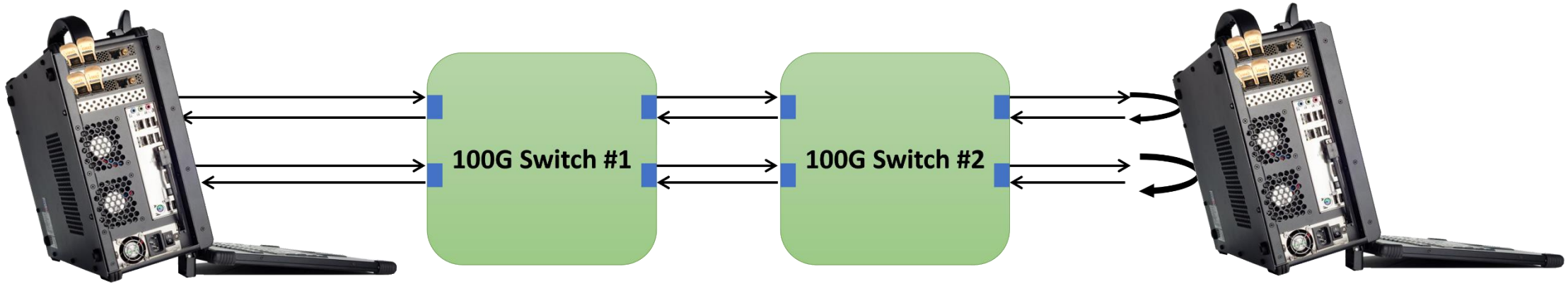




GL Communications

# All Port Loopback

# All Port Loopback




**PacketExpert™ 100G BERT/RFC2544**

**Example:**
**MAC address** - 00-00-00-00-00-01
**IP Address** - 192.168.1.100
**UDP Port** - 1000

**PacketExpert™ 100G Loopback**

**Example:**
**MAC address** - 00-00-00-00-00-02
**IP Address** - 192.168.1.200
**UDP Port** - 2000

- PacketExpert™ 100G has Loopback capability on both ports
- PacketExpert™ 100G supports Smart Loopback
- The above diagram depicts Loopback (Source and Destination MAC addresses swapped) prior to re-transmitting Ethernet frame

GL Communications

# Smart Loopback (Contd.)

**Incoming Packet**

| Ethernet Destination MAC Address | Ethernet Source MAC Address | Ethernet Length/Type field | | Source IP Address | Destination IP Address | IP Protocol | | Source UDP Port | Destination UDP Port |
|---|---|---|---|---|---|---|---|---|---|
| 00-00-00-00 00 02 | 00-00-00-00-00-01 | 08·00 (IP) | … | 192.168.1.100 | 192.168.1.200 | 17 (UDP) | ... | 1000 | 2000 |

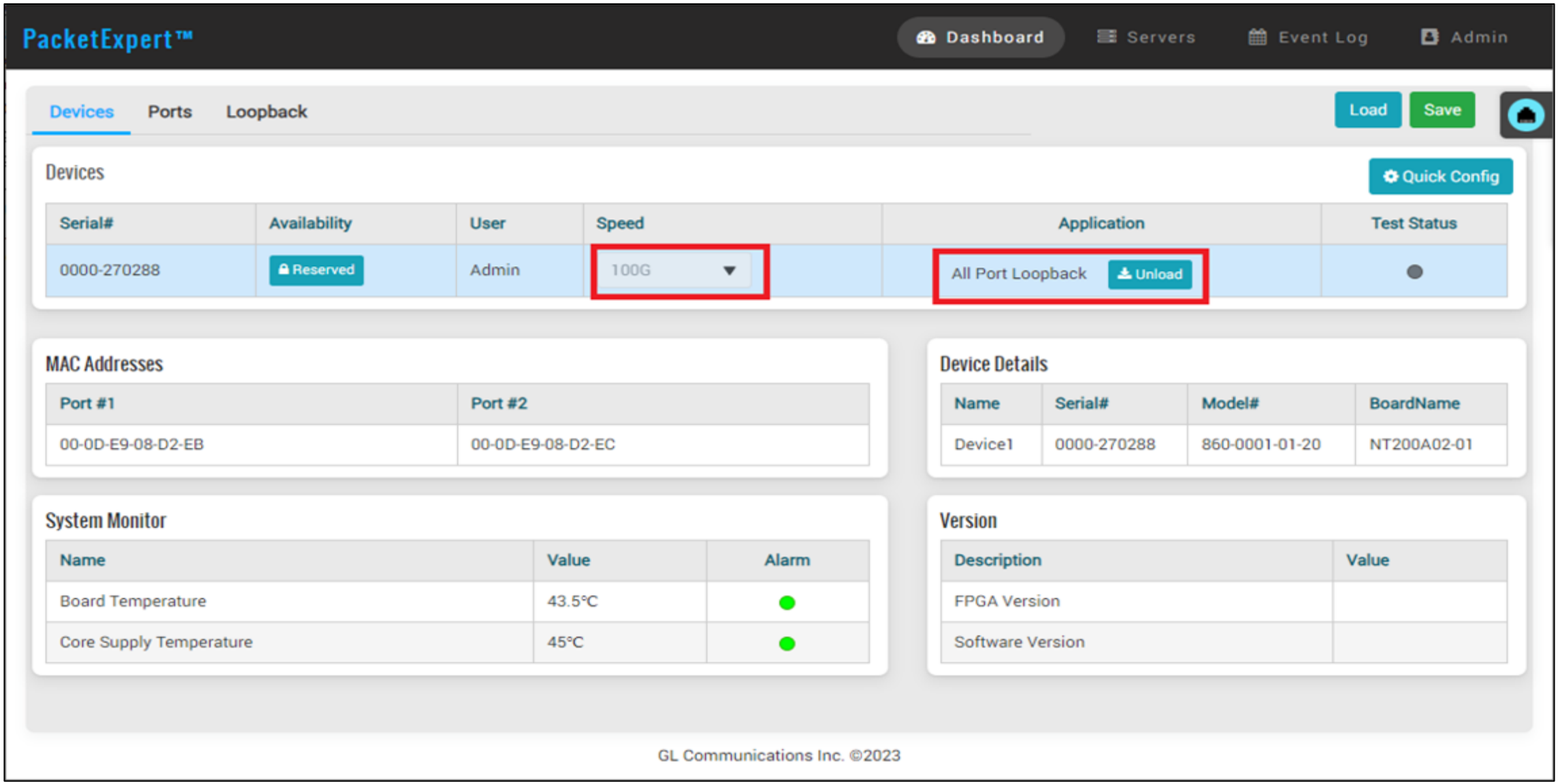
**Outgoing Packet (after swapping Source/Destination MAC addresses, Source/Destination IP Addresses and Source/Destination UDP Ports)**

| Ethernet Destination MAC Address | Ethernet Source MAC Address | Ethernet Length/Type field | | Source IP Address | Destination IP Address | IP Protocol | | Source UDP Port | Destination UDP Port |
|---|---|---|---|---|---|---|---|---|---|
| 00 00-00 00 00-01 | 00-00-00-00-00-02 | 08 00 (IP) | … | 192.168.1.200 | 192.168.1.100 | 17(UDP) | .... | 2000 | 1000 |

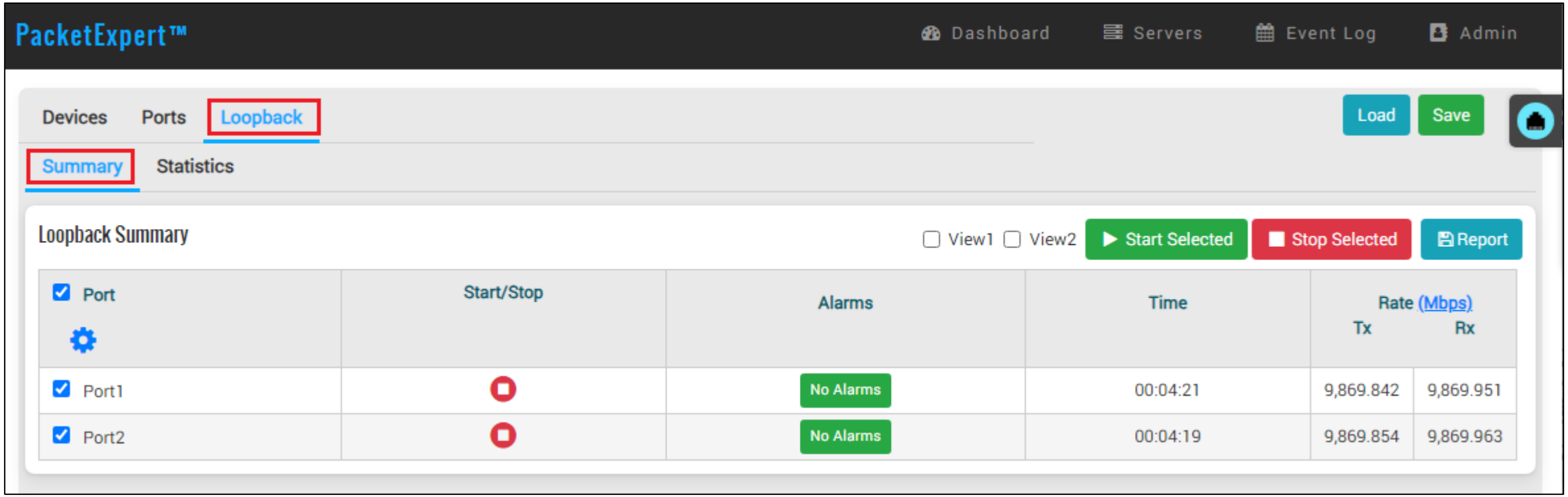
**PacketExpert™ 100G**

GL Communications

# Loading All Port Loopback Application

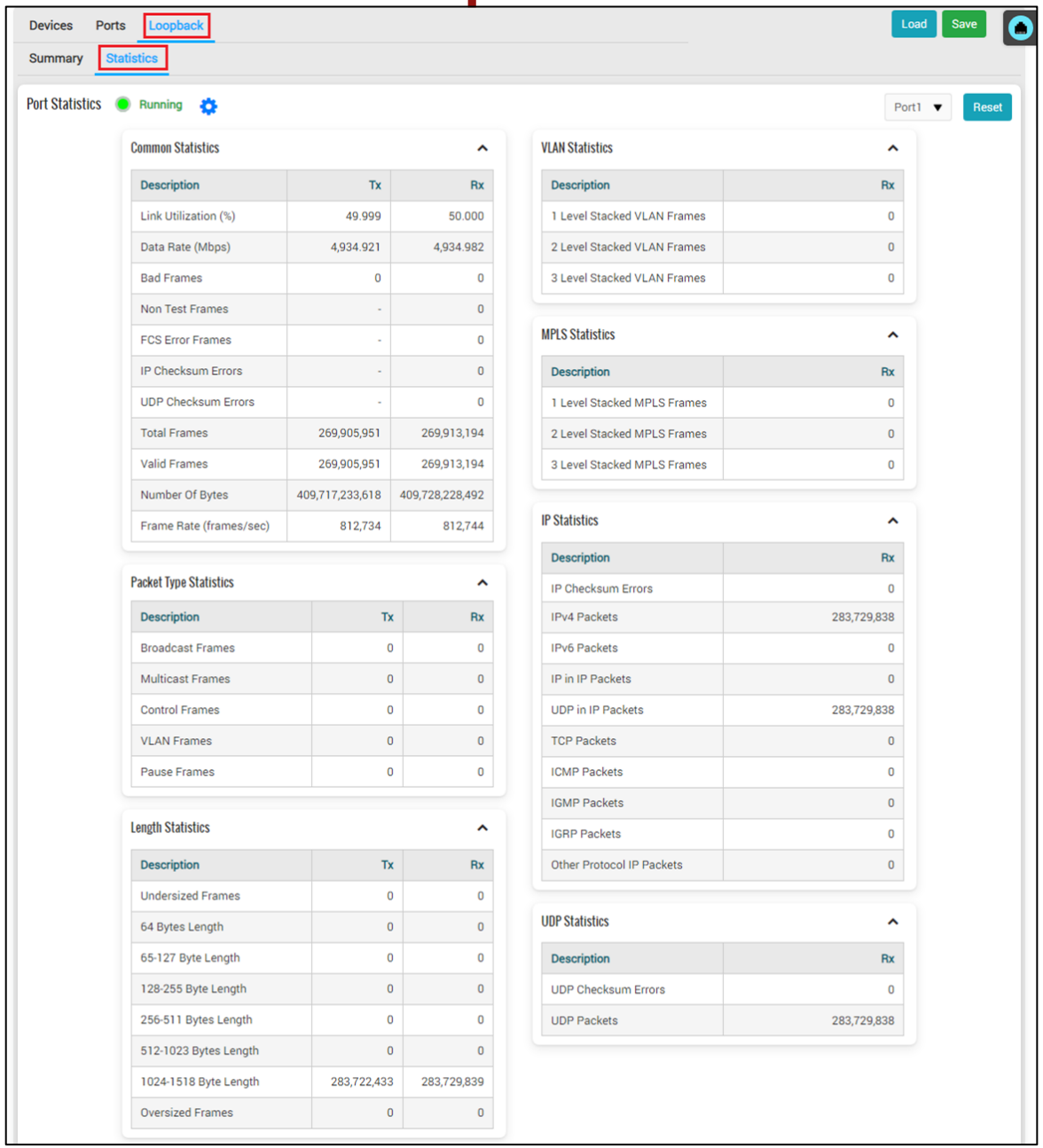


# All Port Loopback Summary




GL Communications

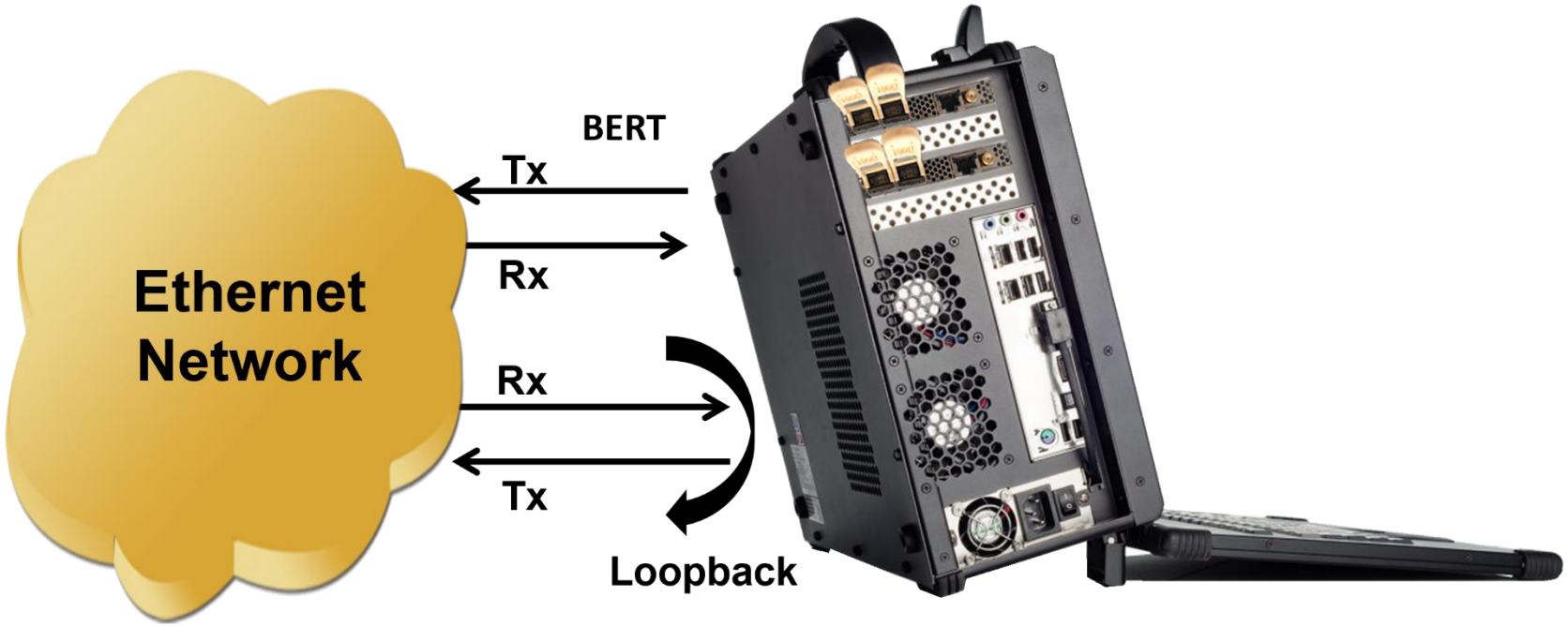
# All Port Loopback Statistics




GL Communications

# BERT and Loopback

# BERT and Loopback



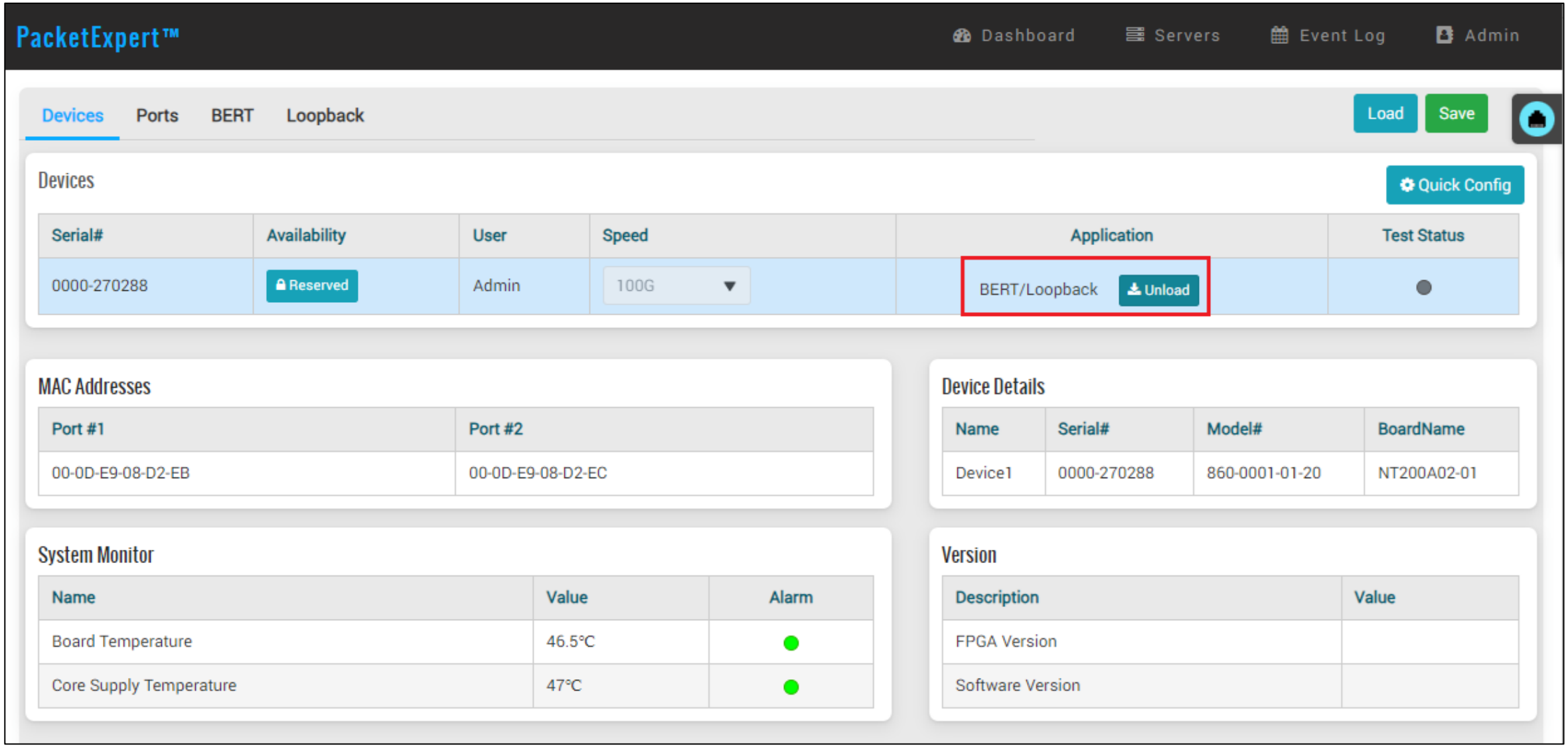

**PacketExpert™ 100G w/ Rest Server**

**(Port #1 MAC Address = aa-aa-aa-aa-aa-aa)**

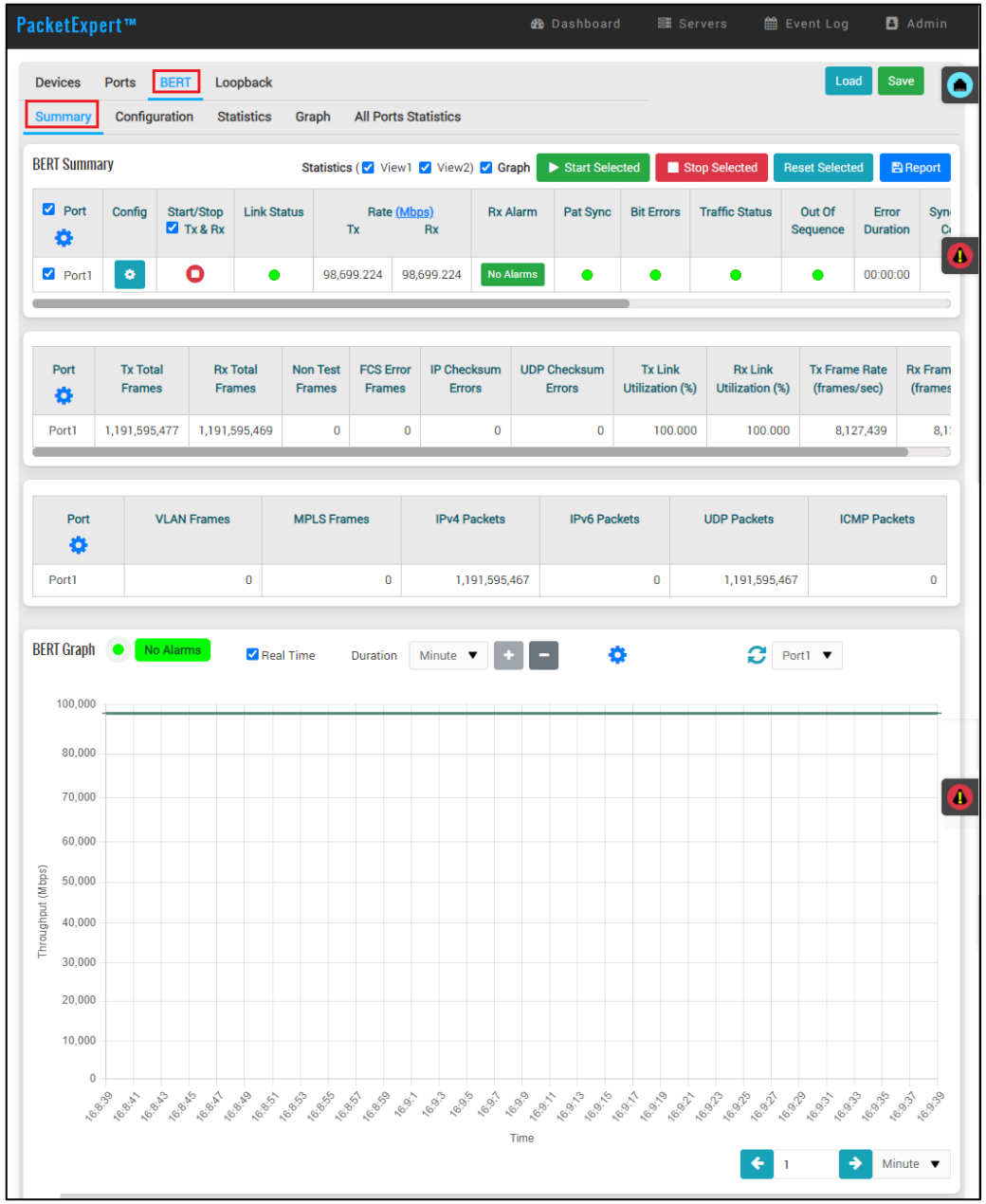
**(Port #2 MAC Address = (bb-bb-bb-bb-bb-bb)**

- For testing across a network, the remote PacketExpert™ 100G can be left in Loopback mode. BERT is controlled by the local end PacketExpert™ 100G

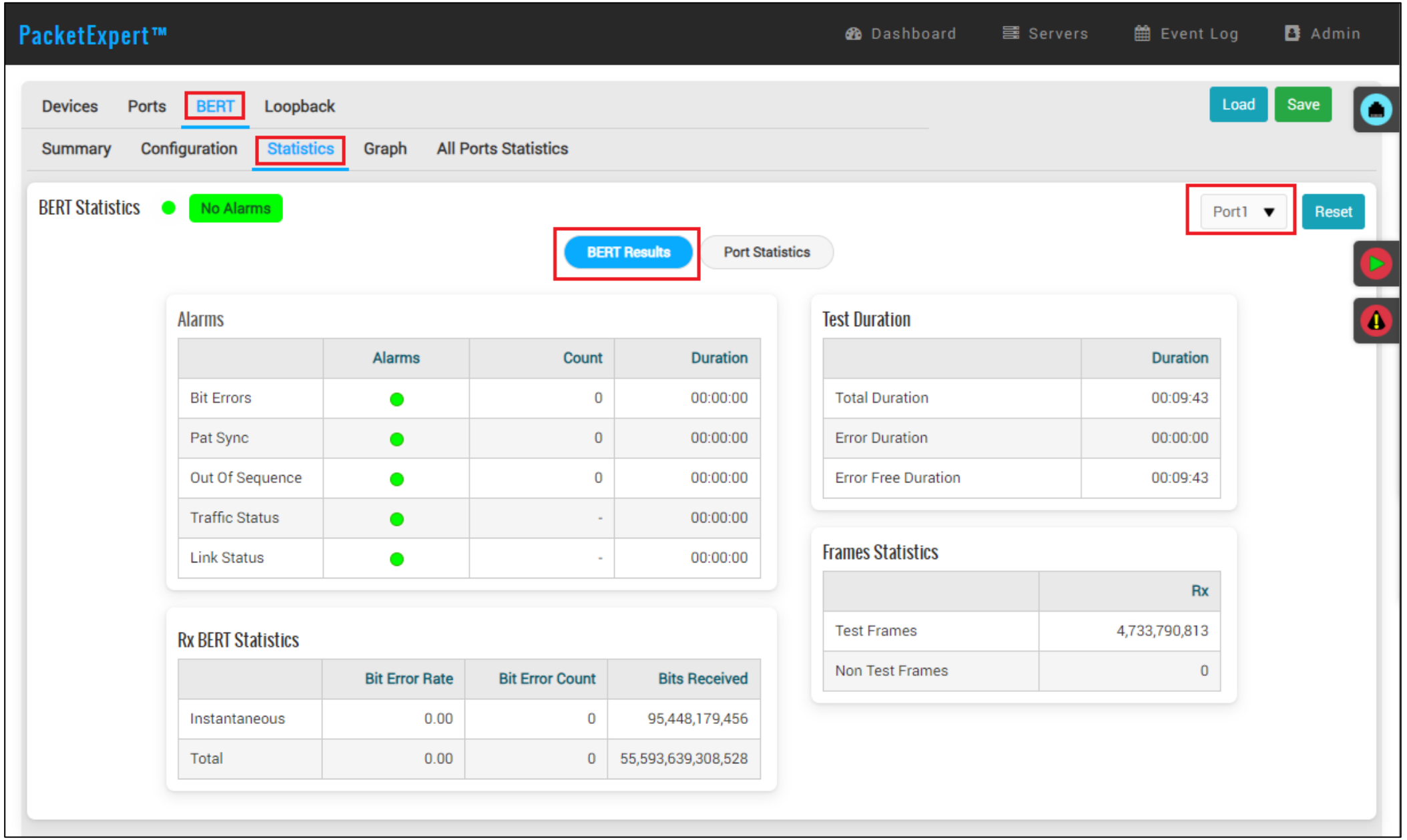
# Loading BERT and Loopback Application



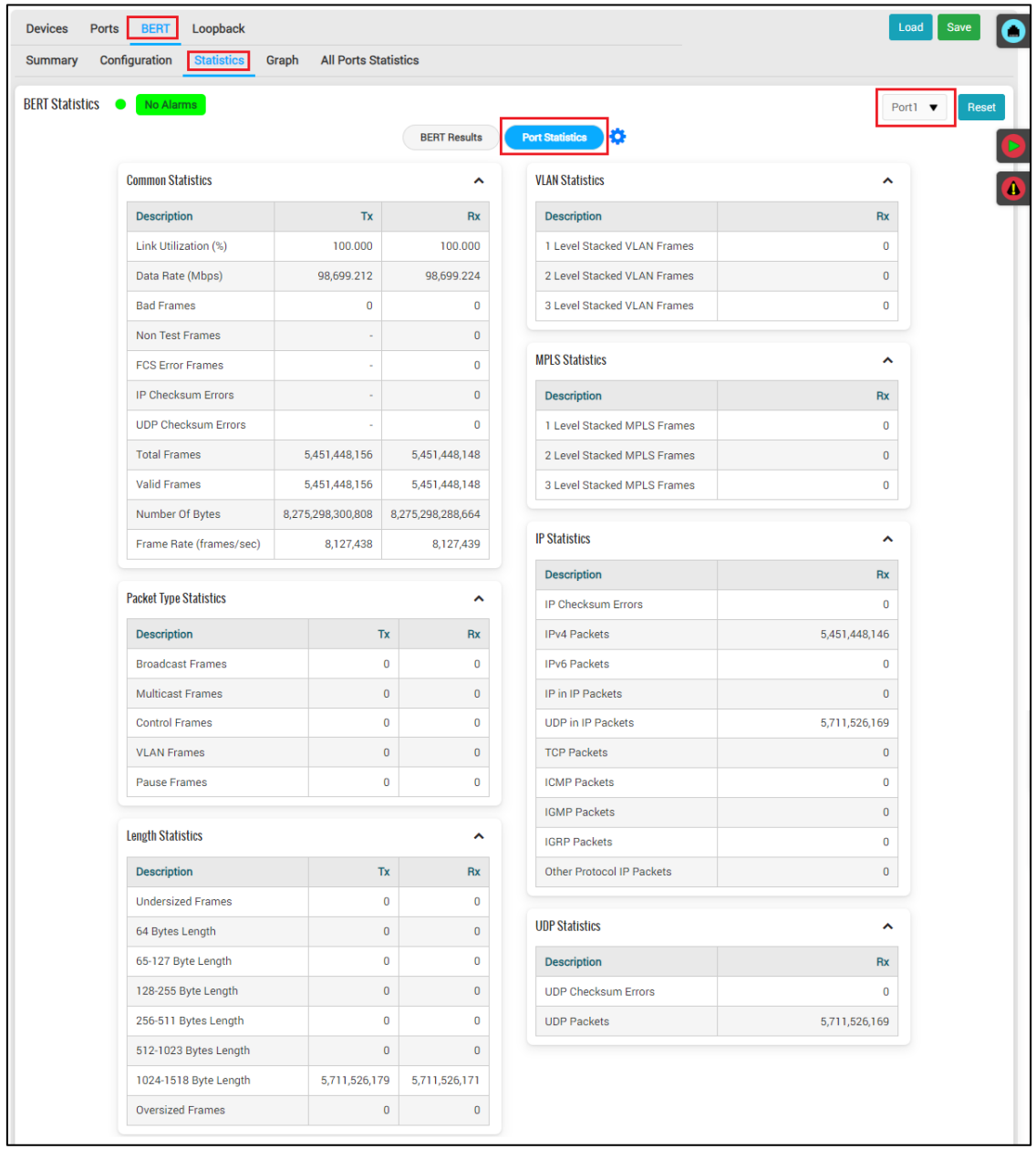
# BERT Summary



# BERT Results

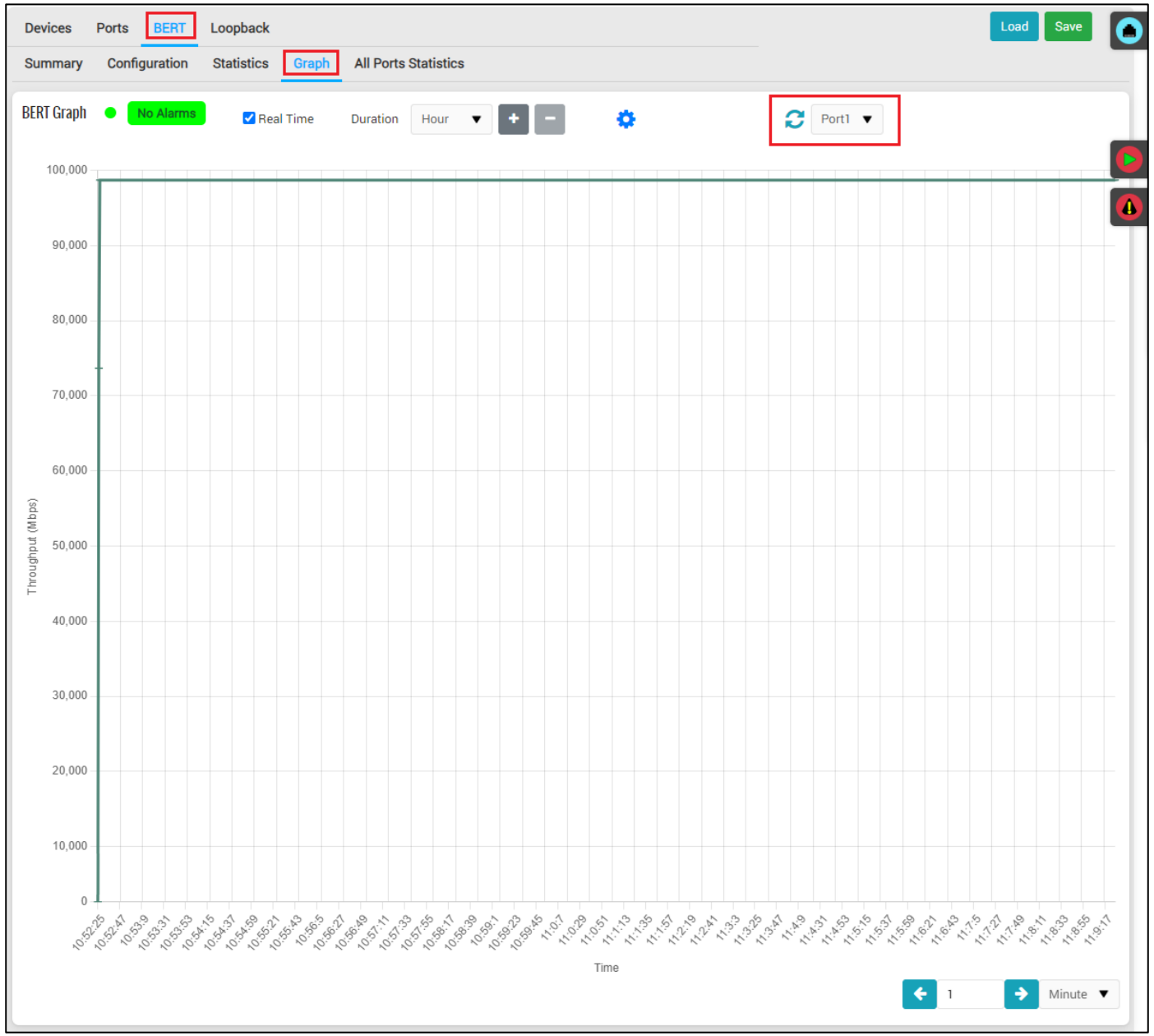


# BERT Port Statistics

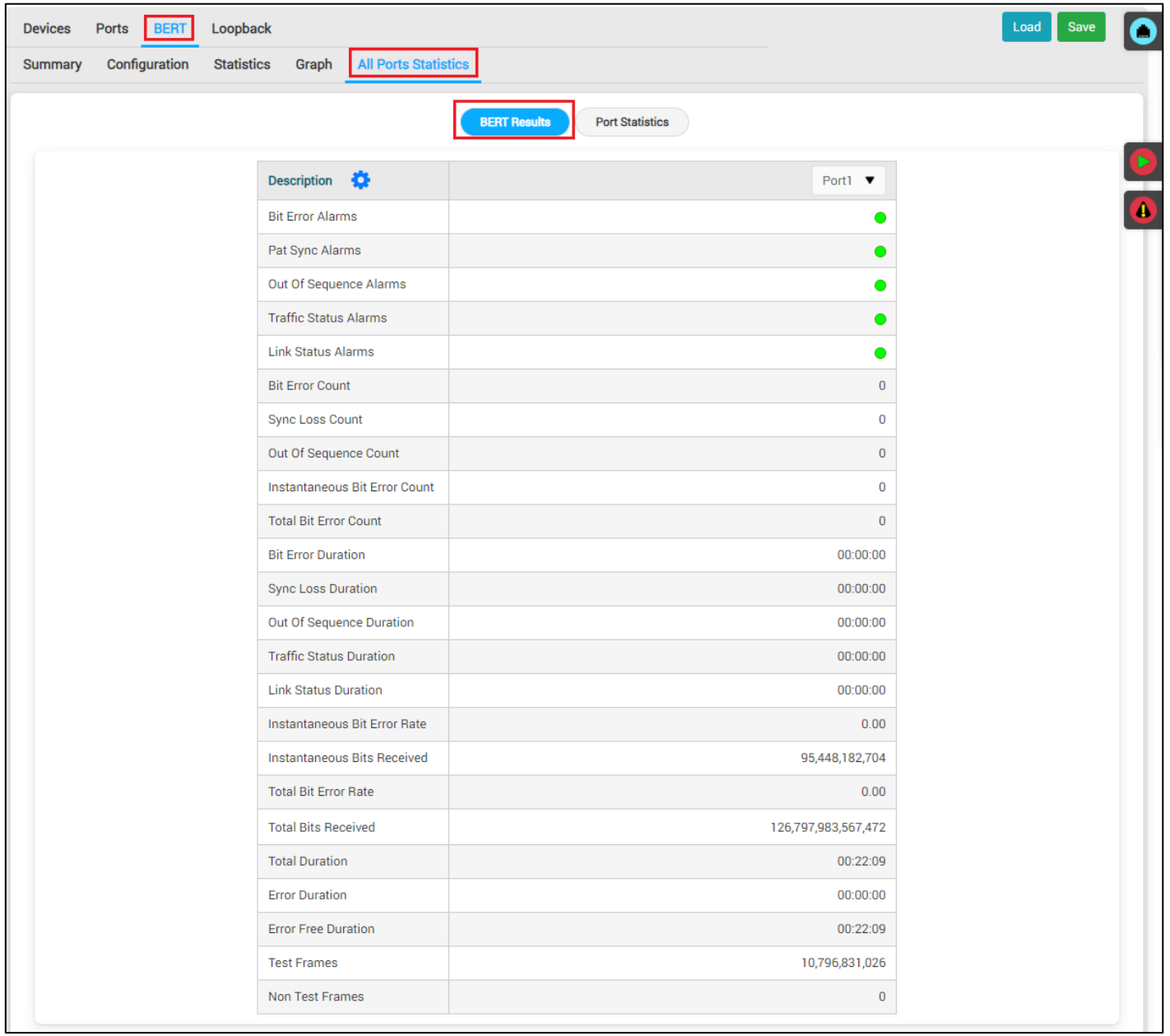



GL Communications

# All Port Loopback - BERT Graph



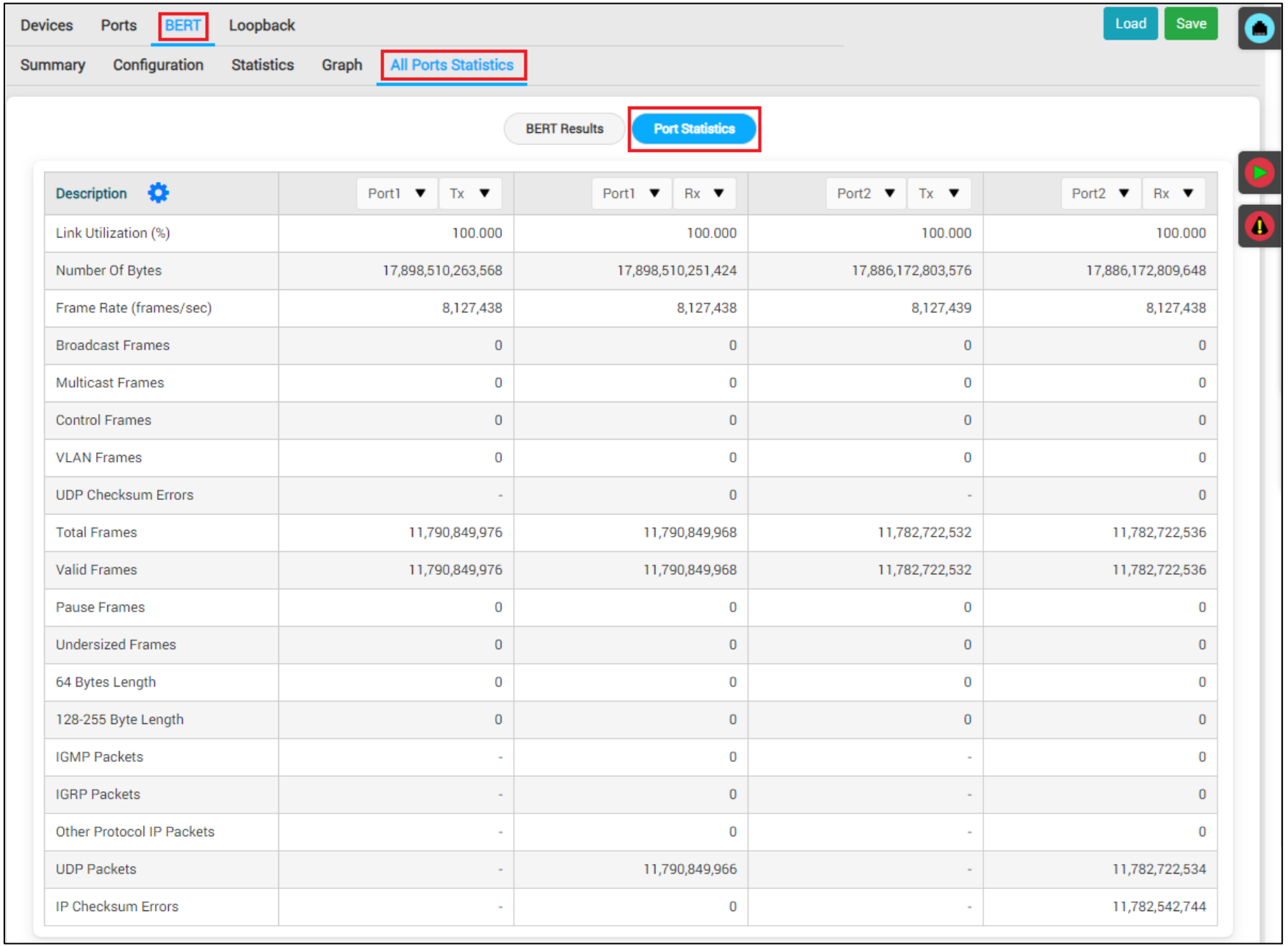
# All Ports Statistics -BERT Results




| Description | Port1 |
|---|---|
| Bit Error Alarms | |
| Pat Sync Alarms | |
| Out Of Sequence Alarms | |
| Traffic Status Alarms | |
| Link Status Alarms | |
| Bit Error Count | 0 |
| Sync Loss Count | 0 |
| Out Of Sequence Count | 0 |
| Instantaneous Bit Error Count | 0 |
| Total Bit Error Count | 0 |
| Bit Error Duration | 00:00:00 |
| Sync Loss Duration | 00:00:00 |
| Out Of Sequence Duration | 00:00:00 |
| Traffic Status Duration | 00:00:00 |
| Link Status Duration | 00:00:00 |
| Instantaneous Bit Error Rate | 0.00 |
| Instantaneous Bits Received | 95,448,182,704 |
| Total Bit Error Rate | 0.00 |
| Total Bits Received | 126,797,983,567,472 |
| Total Duration | 00:22:09 |
| Error Duration | 00:00:00 |
| Error Free Duration | 00:22:09 |
| Test Frames | 10,796,831,026 |
| Non Test Frames | 0 |

GL Communications

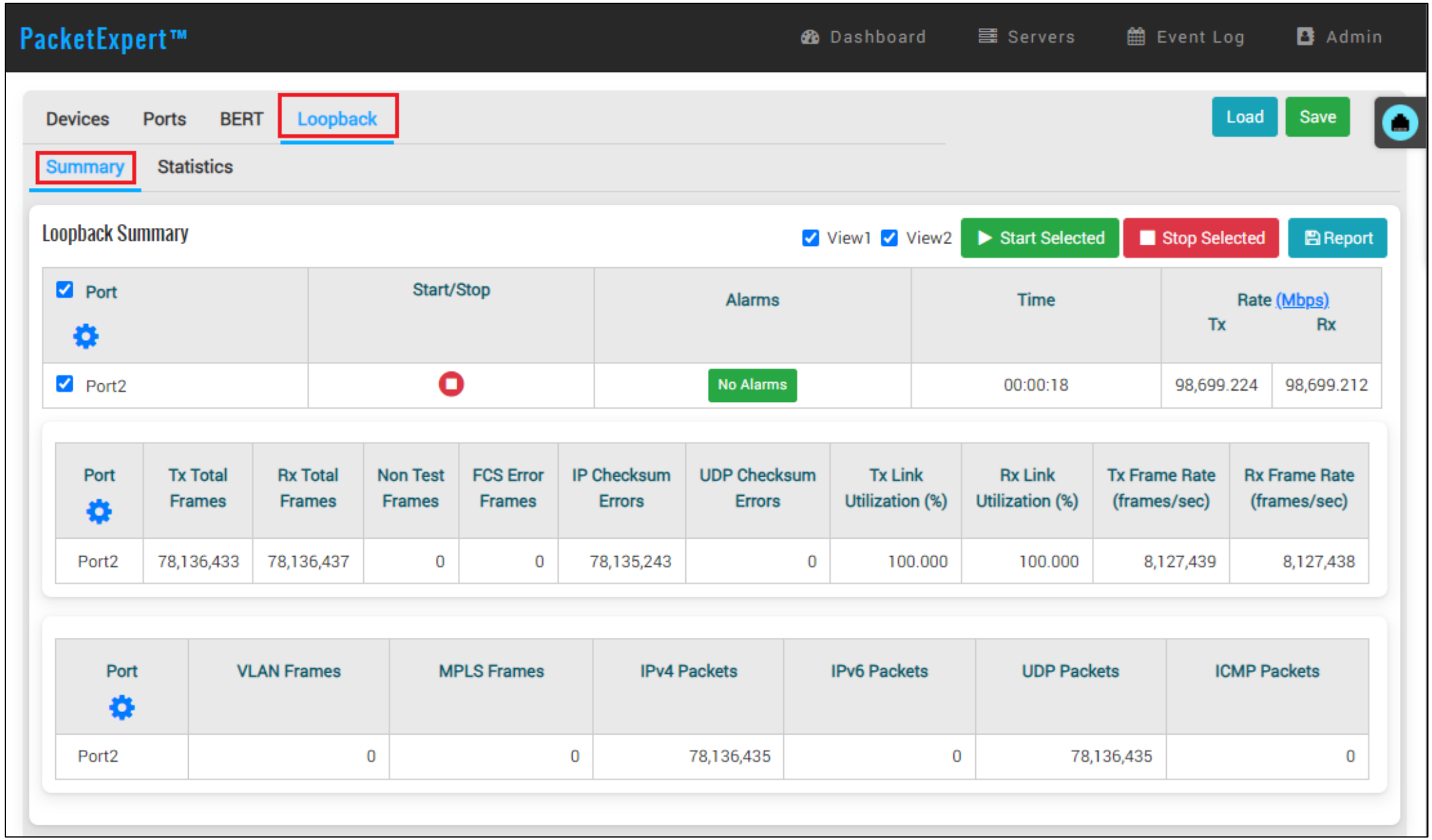
# All Ports Statistics -BERT Results




| Description | Port1 Tx | Port1 Rx | Port2 Tx | Port2 Rx |
|---|---|---|---|---|
| Link Utilization (%) | 100.000 | 100.000 | 100.000 | 100.000 |
| Number Of Bytes | 17,898,510,263,568 | 17,898,510,251,424 | 17,886,172,803,576 | 17,886,172,809,648 |
| Frame Rate (frames/sec) | 8,127,438 | 8,127,438 | 8,127,439 | 8,127,438 |
| Broadcast Frames | 0 | 0 | 0 | 0 |
| Multicast Frames | 0 | 0 | 0 | 0 |
| Control Frames | 0 | 0 | 0 | 0 |
| VLAN Frames | 0 | 0 | 0 | 0 |
| UDP Checksum Errors | - | 0 | - | 0 |
| Total Frames | 11,790,849,976 | 11,790,849,968 | 11,782,722,532 | 11,782,722,536 |
| Valid Frames | 11,790,849,976 | 11,790,849,968 | 11,782,722,532 | 11,782,722,536 |
| Pause Frames | 0 | 0 | 0 | 0 |
| Undersized Frames | 0 | 0 | 0 | 0 |
| 64 Bytes Length | 0 | 0 | 0 | 0 |
| 128-255 Byte Length | 0 | 0 | 0 | 0 |
| IGMP Packets | - | 0 | - | 0 |
| IGRP Packets | - | 0 | - | 0 |
| Other Protocol IP Packets | - | 0 | - | 0 |
| UDP Packets | - | 11,790,849,966 | - | 11,782,722,534 |
| IP Checksum Errors | - | 0 | - | 11,782,542,744 |

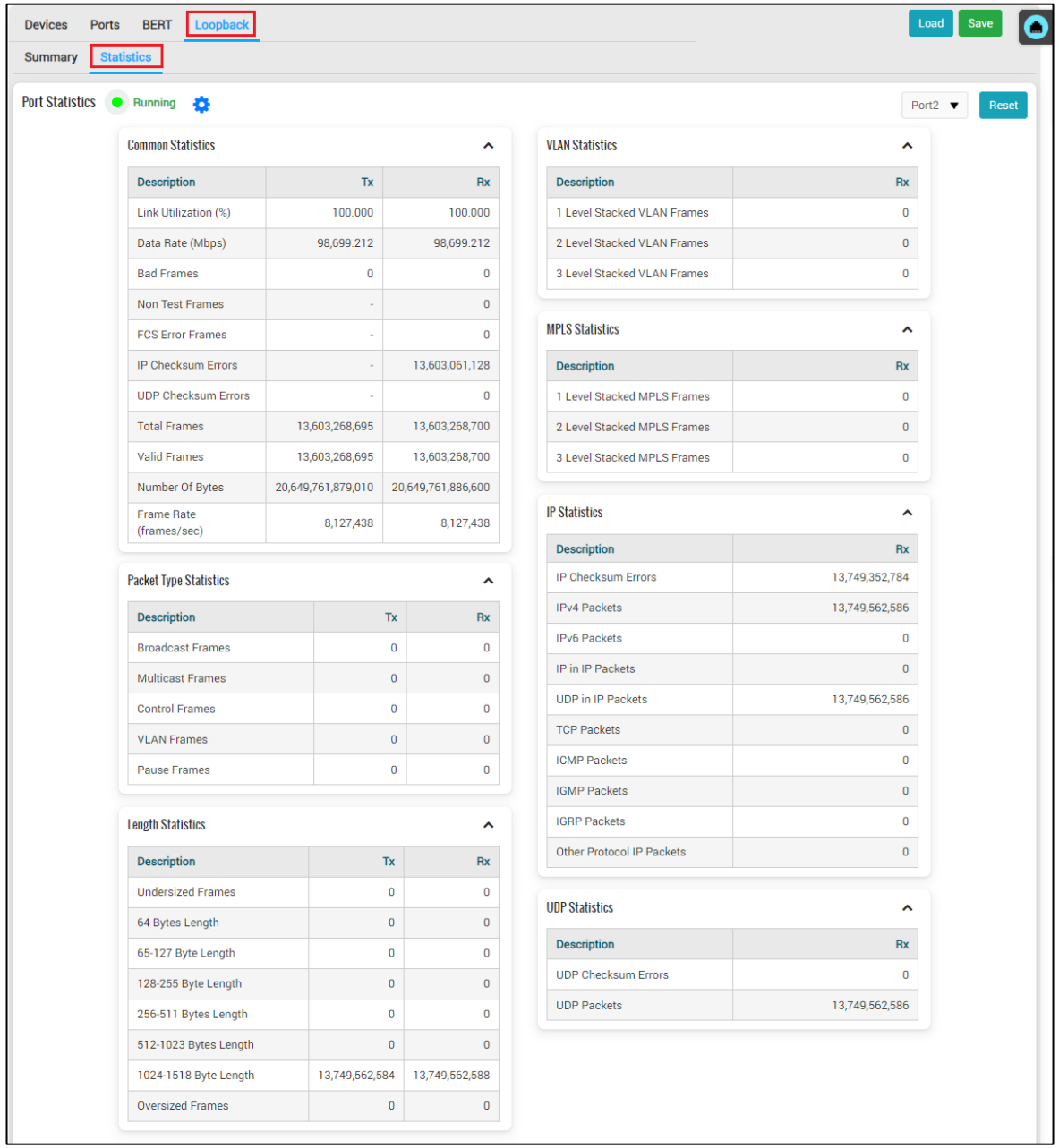
GL Communications

# Loopback Summary



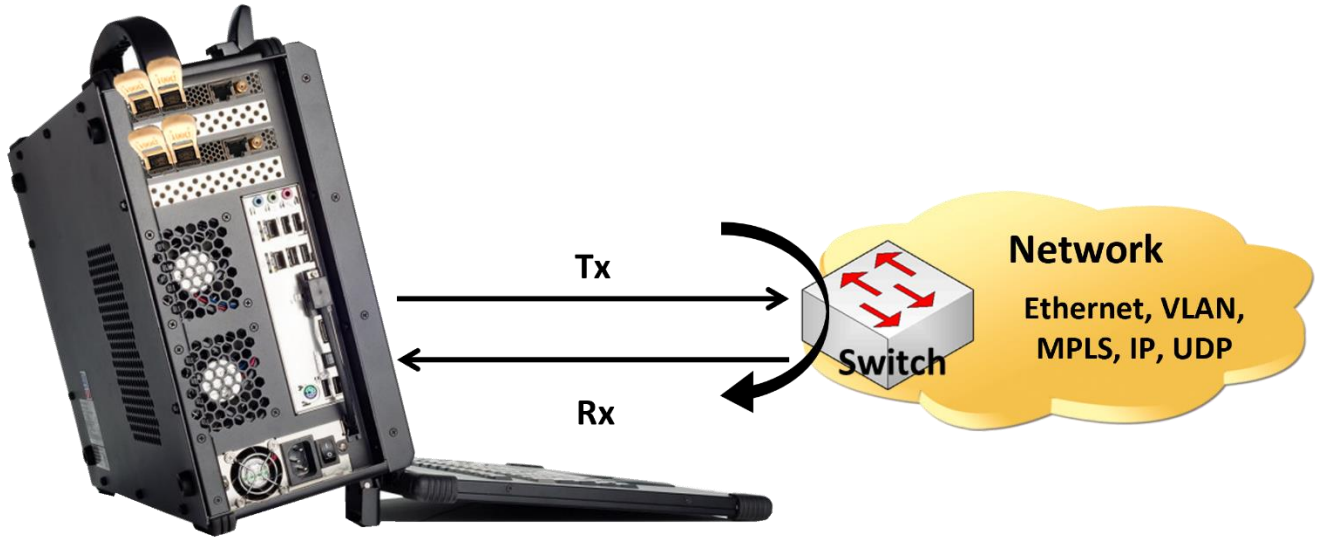

GL Communications

# Loopback Statistics



# RFC 2544

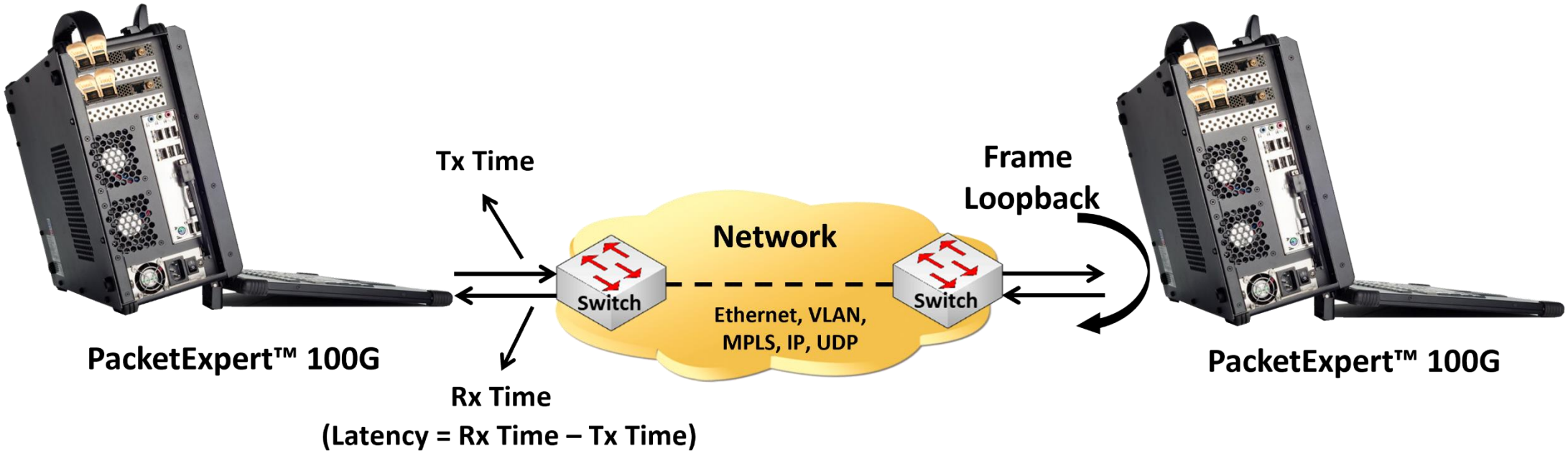
# Dual RFC 2544 Testing




RFC 2544 test application includes the following tests:

- **Throughput** - Maximum number of frames per second that can be transmitted without any error
- **Latency** - Measures the time required for a frame to travel from the originating device through the network to the destination device
- **Frame Loss** - Measures the network's response in overload conditions
- **Back-to-Back** - Measures the maximum number of frames received at full line rate before a frame is lost

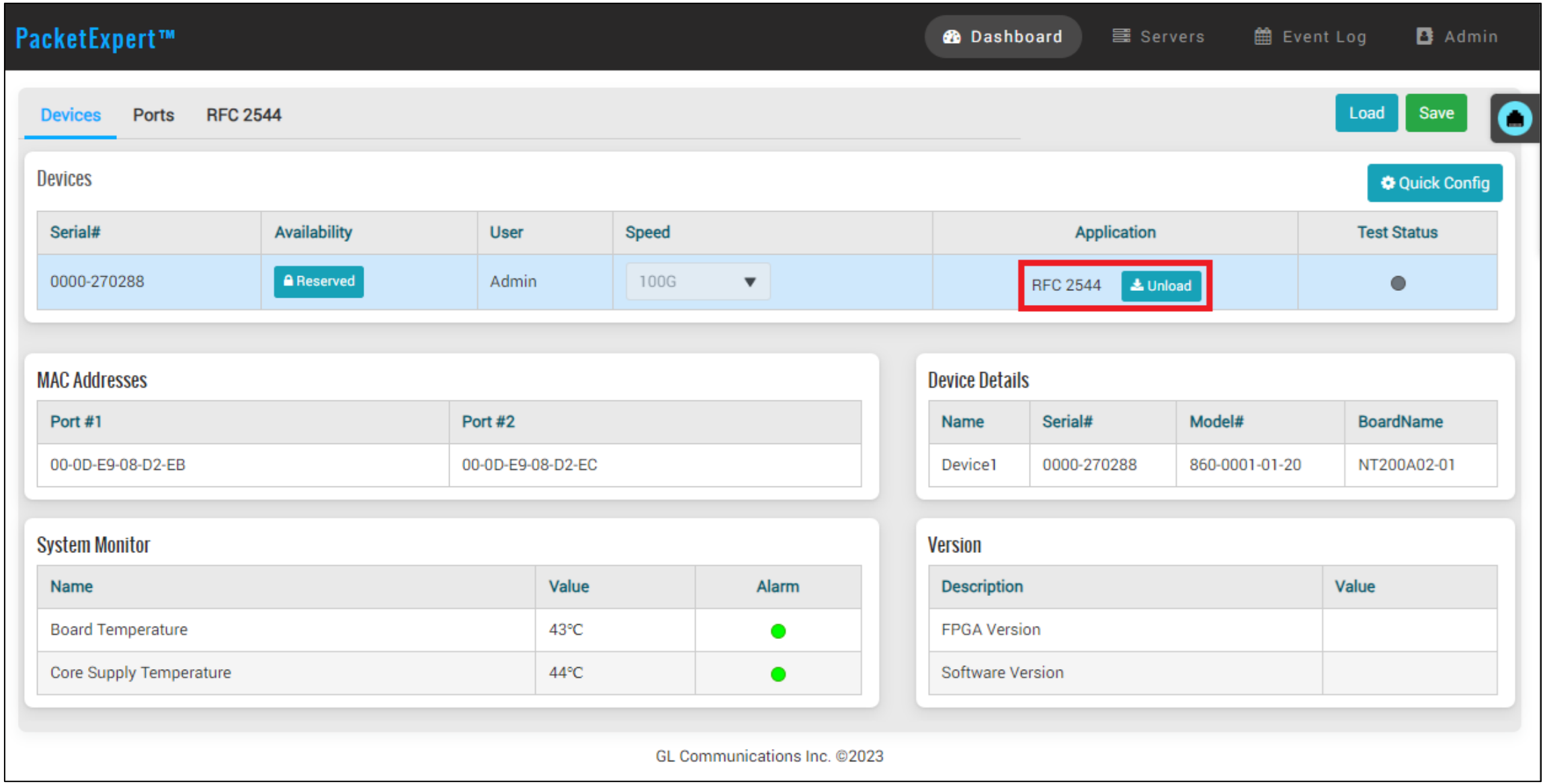
# Single Port RFC 2544




In single port RFC 2544 test,

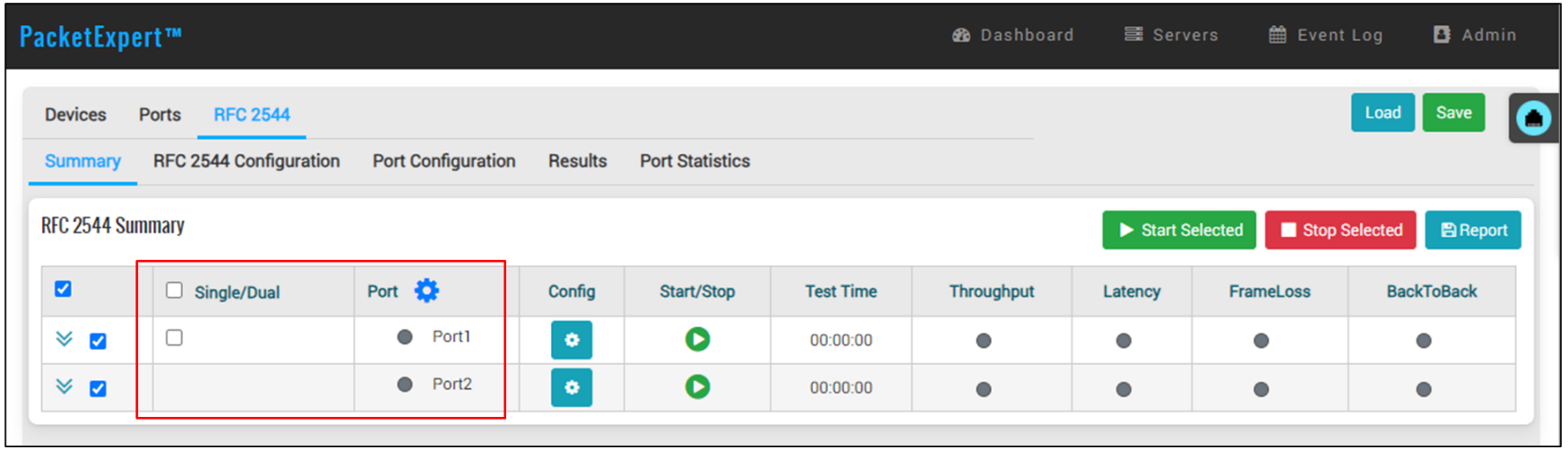
- For PacketExpert™ 100G, the RFC 2544 test can be done either on Port #1 or Port #2 at a time and it is not possible to run RFC 2544 test on both the ports (Port #1, Port #2) simultaneously

# Loading RFC 2544 Application

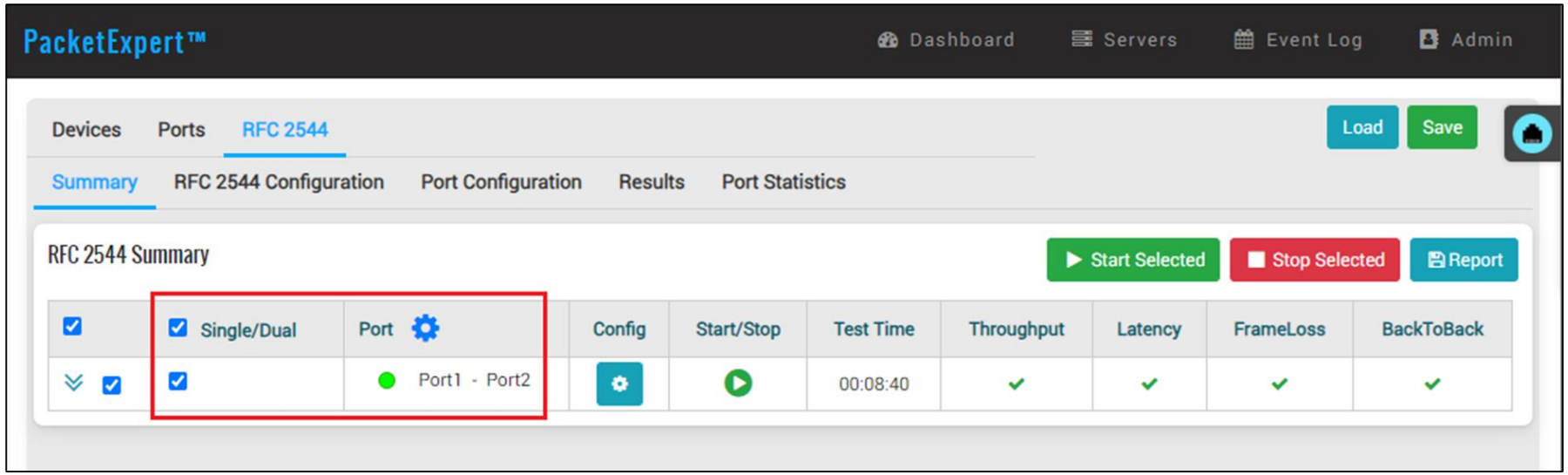


# Single and Dual Port RFC 2544 Applications

**Single Port RFC 2544**

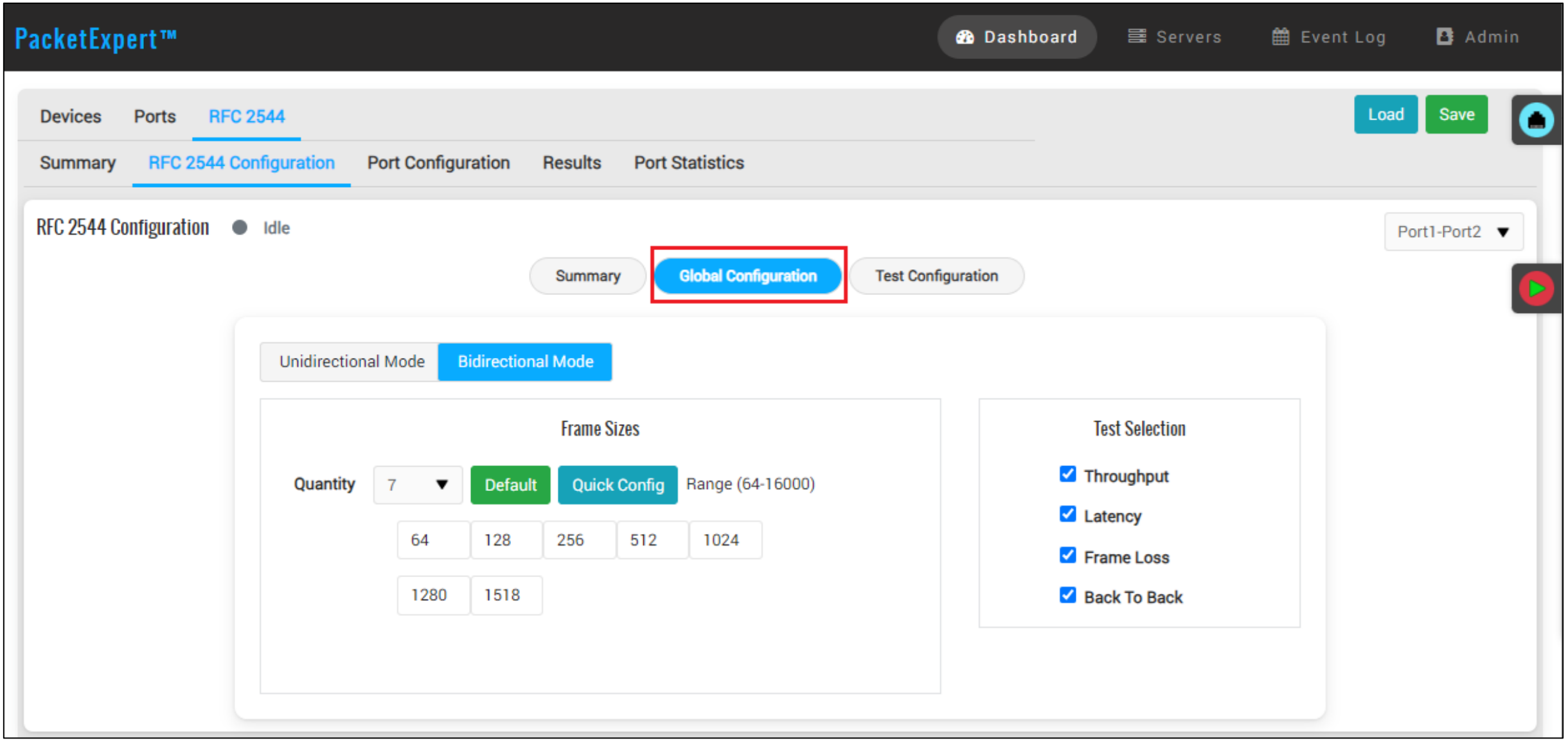



**Dual Port RFC 2544**

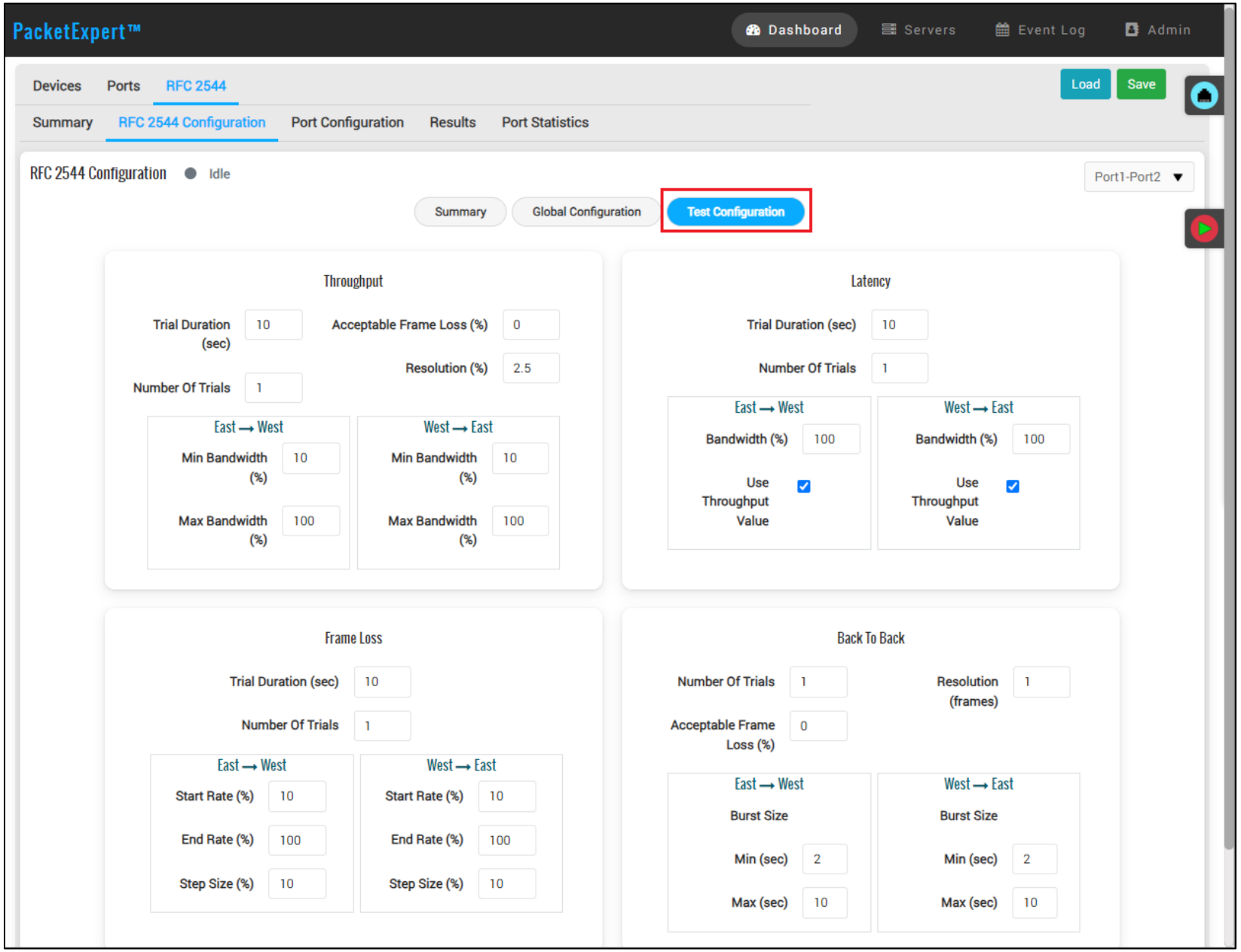



GL Communications

# RFC 2544 - Global Configurations

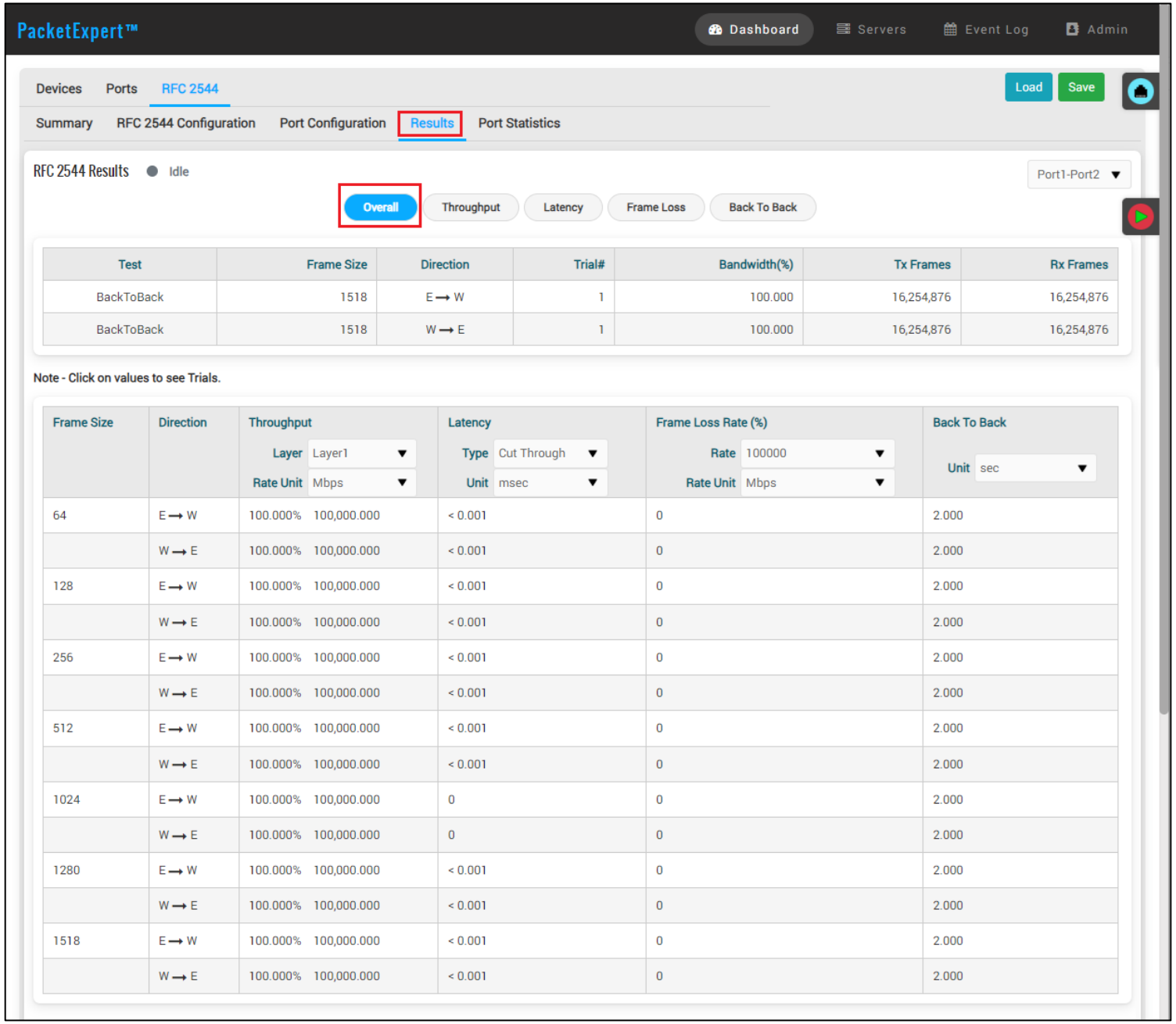


# RFC 2544 - Test Configurations



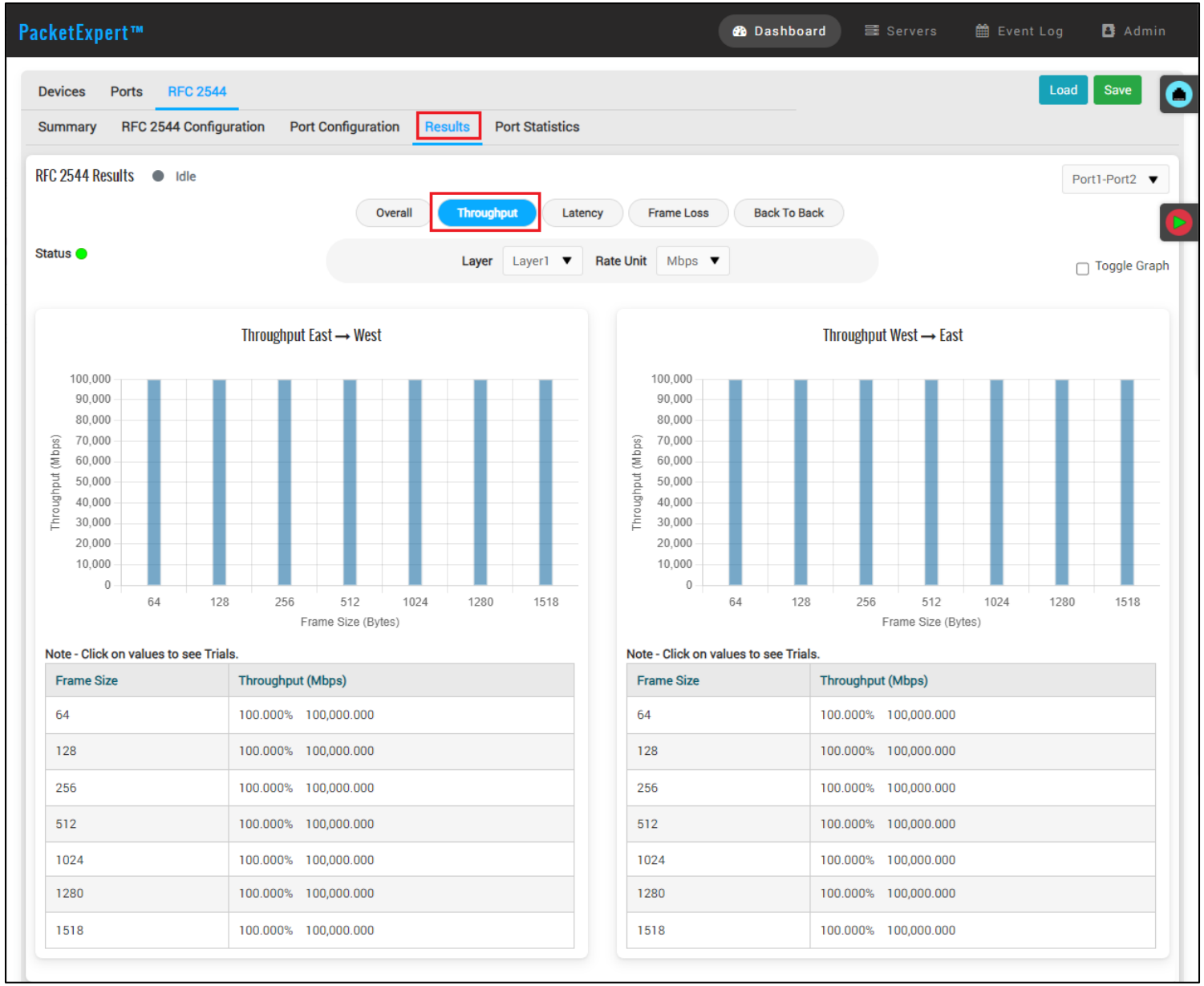

GL Communications

# RFC 2544 Results - Overall



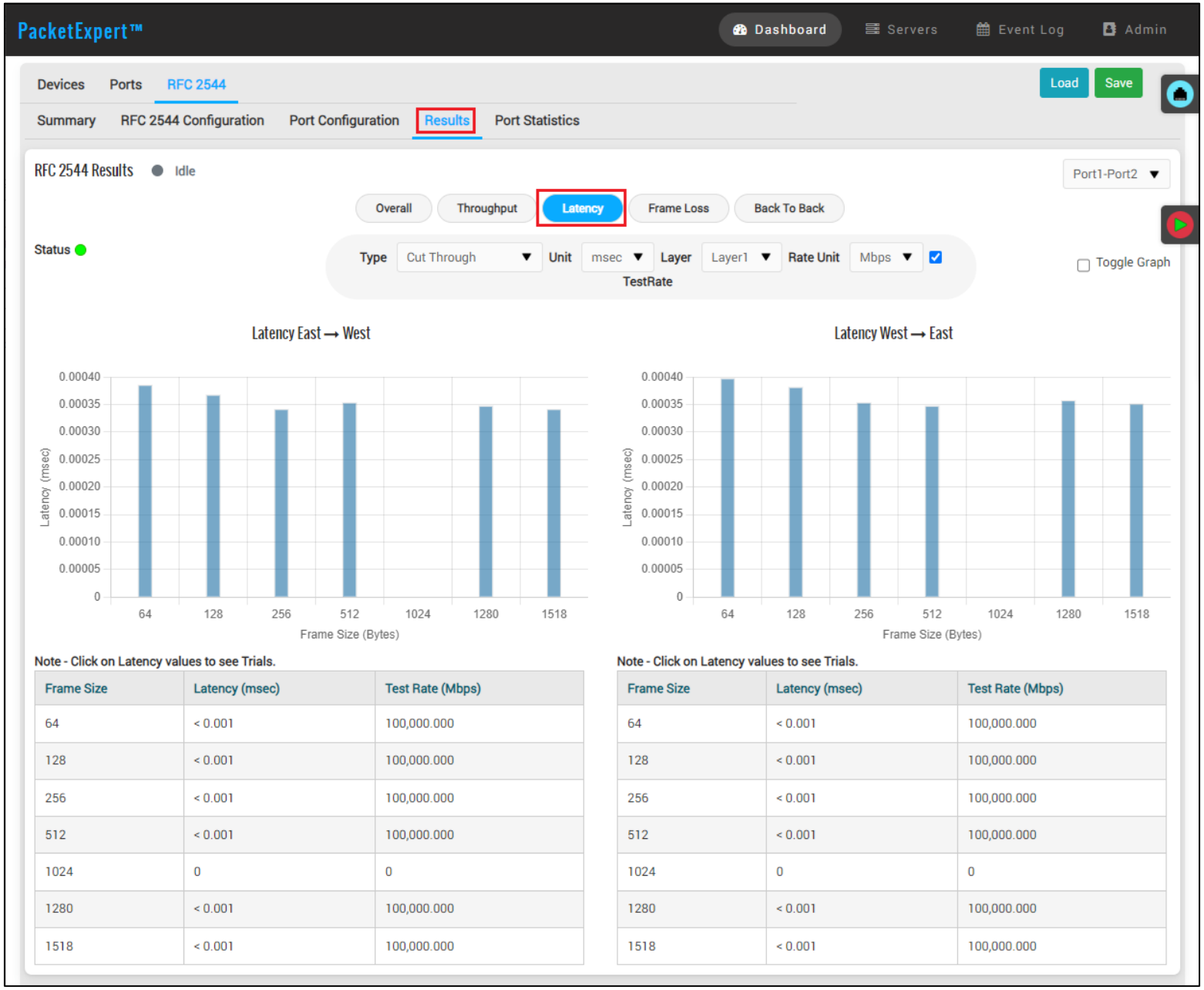

GL Communications

# RFC 2544 Results - Throughput

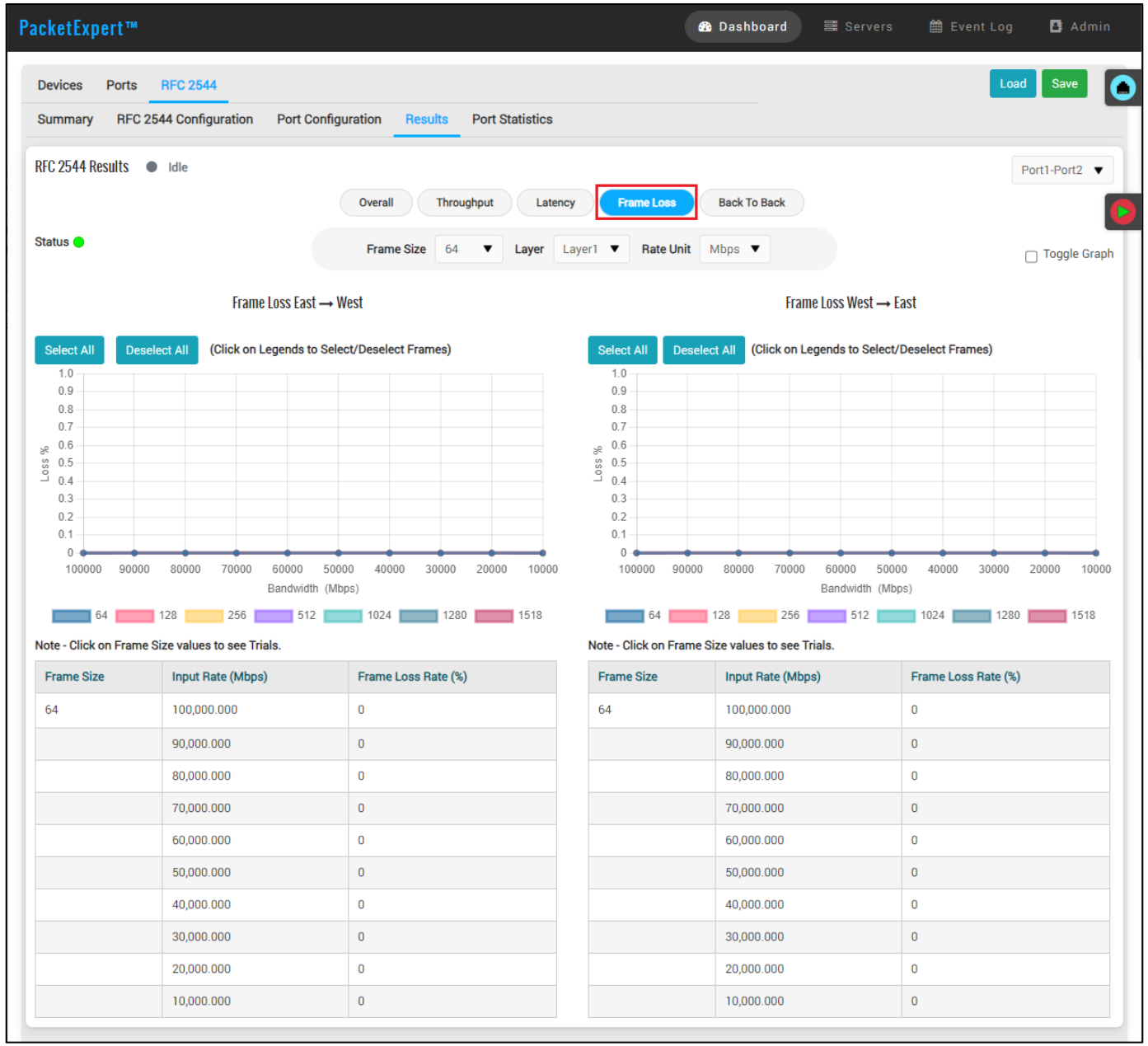



GL Communications

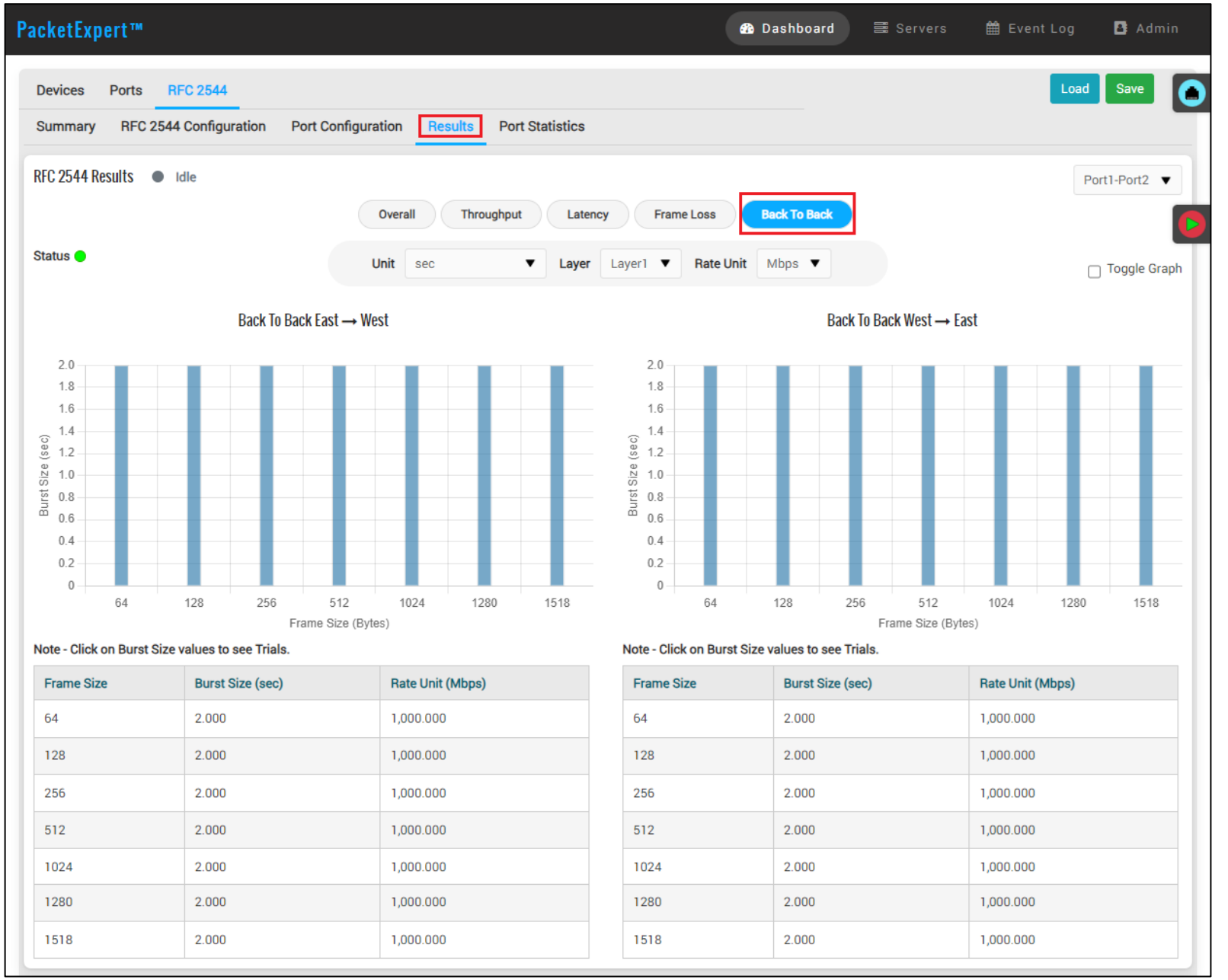
# RFC 2544 Results - Latency



# RFC 2544 Results - Frame Loss



# RFC 2544 Results - Back to Back




Note - Click on Burst Size values to see Trials.

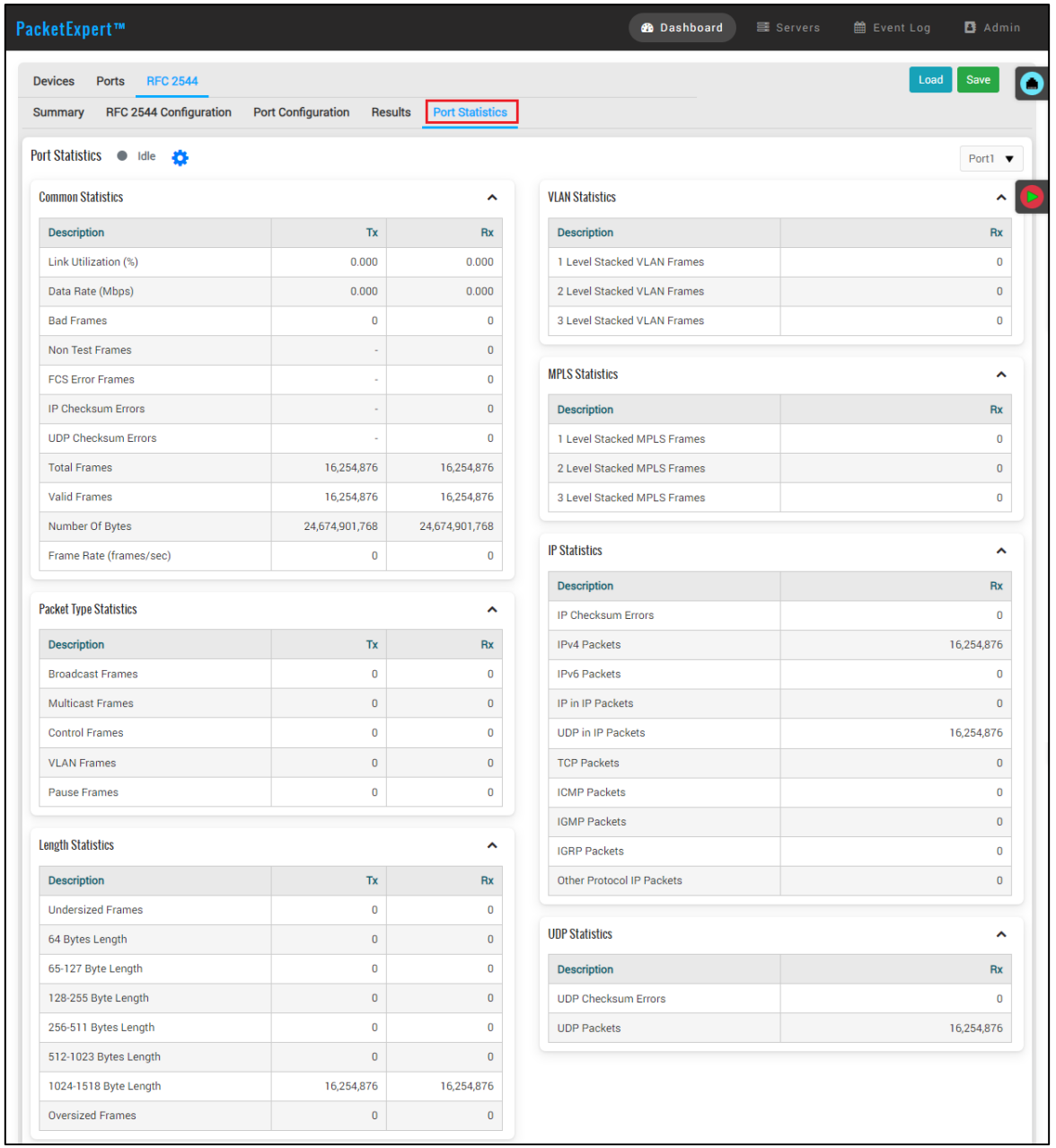
| Frame Size | Burst Size (sec) | Rate Unit (Mbps) |
|---|---|---|
| 64 | 2.000 | 1,000.000 |
| 128 | 2.000 | 1,000.000 |
| 256 | 2.000 | 1,000.000 |
| 512 | 2.000 | 1,000.000 |
| 1024 | 2.000 | 1,000.000 |
| 1280 | 2.000 | 1,000.000 |
| 1518 | 2.000 | 1,000.000 |

Note - Click on Burst Size values to see Trials.

| Frame Size | Burst Size (sec) | Rate Unit (Mbps) |
|---|---|---|
| 64 | 2.000 | 1,000.000 |
| 128 | 2.000 | 1,000.000 |
| 256 | 2.000 | 1,000.000 |
| 512 | 2.000 | 1,000.000 |
| 1024 | 2.000 | 1,000.000 |
| 1280 | 2.000 | 1,000.000 |
| 1518 | 2.000 | 1,000.000 |

GL Communications

# RFC 2544 Port Statistics



# Thank you